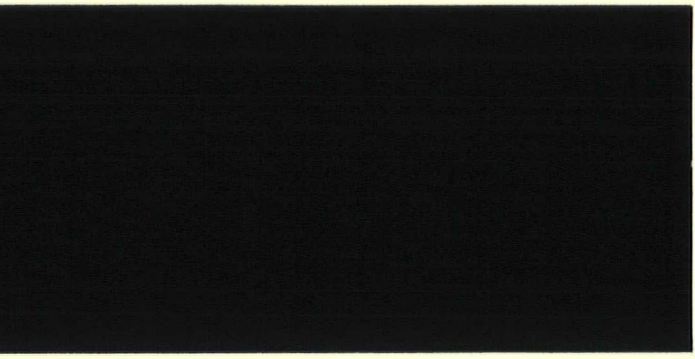


RECORD OF DECISION
for
OPERABLE UNIT 1
FORT WAINWRIGHT
FAIRBANKS, ALASKA

6/97

JUNE 1997

DECLARATION STATEMENT
for
RECORD OF DECISION
FORT WAINWRIGHT
FAIRBANKS, ALASKA
OPERABLE UNIT 1

SOURCE AREA NAME AND LOCATION

Operable Unit 1
Fort Wainwright
Fairbanks, Alaska

STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) presents the selected remedial action for the 801 Drum Burial Site for Operable Unit 1 (OU-1) at Fort Wainwright in Fairbanks, Alaska. OU-1 originally included 22 suspected source areas: the 801 Drum Burial Site, Building 1599, Building 2077, the Utilidor Expansion Drum Site, the Beacon Tower Landfill, the Blair Lakes Drum Site, Building 3015, Burial Site M, the Building 1128 Transformer Storage Yard, the Trainor Gate Railroad Spur, the Runway Radioactive Waste Site, the Birch Hill Radioactive Waste Site, Building 1567, Site N-4, the Chemical Agent Dump Site, the Transformer Storage Yard East of Building 3019, the Alaska Railroad Storage Yard, Building 2250, the Drum Site South of the Landfill, the Engineers Park Drum Site, the Motor Pool Buildings, and the Former Explosive Ordnance Disposal Range.

This ROD was developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986; 42 United States Code Section 9601 et seq.; and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan, 40 Code of Federal Regulations 300 et seq. This decision is based on the Administrative Record for this OU.

The United States Army, the United States Environmental Protection Agency, and the State of Alaska, through the Alaska Department of Environmental Conservation, collectively referred to as *the agencies*, have agreed to the selected remedies.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from the 801 Drum Burial Site source area, if not addressed by implementing the response actions selected in this ROD, may present substantial endangerment to public health, welfare, or the environment. Pesticides and petroleum-related compounds are contaminants of concern in the soil; and benzene, pesticides, solvents, and other petroleum-related compounds are contaminants of concern in groundwater at the 801 Drum Burial Site.

This is the fourth OU of five OUs at Fort Wainwright to reach a final-action ROD at this National Priorities List site. This ROD addresses soil and groundwater contamination at OU-1.

DESCRIPTION OF THE SELECTED REMEDIES

OU-1 originally consisted of 22 potential source areas, only four of which were carried through the Remedial Investigation: the 801 Drum Burial Site, Site N-4, Building 1599, and Building #2077. The 801 Drum Burial Site is the only source area recommended for cleanup under CERCLA, based on potential risk to human health and the environment.

The Army and the Alaska Department of Environmental Conservation have a cooperative agreement to address petroleum-contaminated source areas. Two source areas, Buildings 1599 and 2077, are being addressed under this agreement because the contaminants of concern at these source areas are petroleum-related. These source areas do not require any further action under this ROD.

The Motor Pool Buildings and Former Explosive Ordnance Detonation Range will be addressed through the OU-5 decision process. No analyses of remedial alternatives were conducted for these source areas under OU-1.

In August 1995, an interim ROD was signed by the agencies to conduct an Interim Remedial Action at the Chemical Agent Dump Site to ensure that no chemical warfare materials were buried at the source area. Soil and groundwater analytical results from the 1995 Interim Remedial Action indicated that chemical warfare materials and their breakdown products were not present. This source area is recommended for no further action under this ROD.

The no-further-action decision was made for each source area if: 1) the physical location could not be identified or located in the investigation, 2) no visible sign of contamination was observed during the source area inspection, or 3) environmental sampling results showed that contamination is present at levels below the protective human health-based levels. Based on this decision process, the following suspected source areas are recommended for no further action under this ROD: the Utilidor Expansion Drum Site, the Beacon Tower Landfill, the Blair Lakes Drum Site, Building 3015, Burial Site M, the Building 1128 Transformer Storage Yard, the Trainor Gate Railroad Spur, the Runway Radioactive Waste Site, the Birch Hill Radioactive Waste Site, Building 1567, Site N-4, the Transformer Storage Yard East of Building 3019, the Alaska Railroad Storage Yard, Building 2250 (pesticide storage area), the Drum Site South of the Landfill, and the Engineers Park Drum Site. No analysis of remedial alternatives was conducted for these suspected source areas. A description of the no-further-action decisions can be found in the Administrative Record.

The selected remedy for the 801 Drum Burial Site was chosen from the best alternatives presented in the Feasibility Study and is considered the most cost-effective and permanent solution available for addressing contaminated soil and groundwater at this source area. The selected remedy addresses the risk by reducing contamination below cleanup levels established for the 801 Drum Burial Site.

The remedial action objectives for the 801 Drum Burial Site are designed to:

- Ensure that groundwater meets state and federal drinking water standards;
- Prevent buried drums and contaminated soil from continuing to act as a source of groundwater contamination;

- Reduce risks associated with exposure to contaminants in drums and soil; and

- Minimize potential contaminant migration to the Chena River and downgradient drinking water wells.

The major components of the remedies at the 801 Drum Burial Site include:

- Locating potential buried drums and, if found, removing and disposing of drums and contaminated soil, while restricting access to the source area during this work;

- Establish and maintain institutional controls to ensure that the groundwater will not be used until federal and state maximum contaminant levels are attained, except for activities undertaken to initiate the selected remedies detailed in this ROD. Institutional controls include restrictions governing site access, construction, and well development or placement as long as hazardous substances remain on site at levels that preclude unrestricted use. The Army shall ensure compliance with the institutional controls in place at this site because noncompliance will violate a requirement of this ROD, therefore violates the Fort Wainwright Federal Facility Agreement between the Army, U.S. Environmental Protection Agency, and the Alaska Department of Environmental Conservation;

  To ensure long-term effectiveness of this remedy, the Army's permanent implementation processes and policies for implementing institutional controls will be developed through joint U.S. Environmental Protection Agency, the Alaska Department of Environmental Conservation, and Army negotiations. These implementation processes and policies are intended to be in place before the OU-5 postwide ROD;

- Natural attenuation of groundwater with long-term groundwater monitoring; and

- A groundwater contingent remedy, which includes a soil vapor extraction and air sparging treatment system to specifically treat volatile organic compounds. This remedy would be implemented when either: 1) the concentration of contaminants in the groundwater plume shows an increasing trend over any three consecutive sampling events throughout the projected 20-year monitoring period, or 2) the designated monitoring points around the plume indicate that contaminants are migrating away from the source area.

A soil vapor extraction and air sparging treatment system will reduce volatile contaminants to acceptable levels. If a technology becomes available for treating the pesticide contamination, then the agencies may consider modifying the contingency.

STATUTORY DETERMINATION

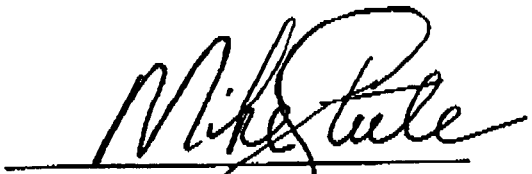
The selected remedial actions are protective of human health and the environment, comply with federal and state requirements that are legally applicable or relevant and appropriate to the remedial actions, and are cost-effective.

The remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. The contingent remedy of soil vapor extraction and air sparging to reduce volatile contaminants will satisfy the statutory preference for remedies that employ treatments that reduce toxicity, mobility, or volume as a principal element.

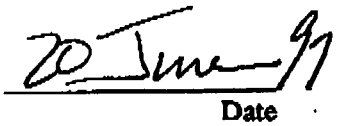
Because these remedies will result in hazardous substances remaining above health-based levels at this source area, a review will be conducted within five years after commencement of remedial action to ensure that the remedies continue to provide adequate protection of human health and the environment.

SIGNATURES

Signature sheet for the foregoing Operable Unit 1, Fort Wainwright, Record of Decision between the United States Army and United States Environmental Protection Agency, Region X, with concurrence by the Alaska Department of Environmental Conservation.



William M. Steele
Lieutenant General U.S. Army
Commanding



Date

SIGNATURES

Signature sheet for the foregoing Operable Unit 1, Fort Wainwright, Record of Decision between the United States Army and United States Environmental Protection Agency, Region X, with concurrence by the Alaska Department of Environmental Conservation.

Chuck Clarke
Regional Administrator, Region X
United States Environmental Protection Agency

JUN 27 1997
Date

SIGNATURES

Signature sheet for the foregoing Operable Unit 1, Fort Wainwright, Record of Decision between the United States Army and United States Environmental Protection Agency, Region X, with concurrence by the Alaska Department of Environmental Conservation.

Lynn J. Tomich Kent
for Kurt Fredriksson
Director, Spill Prevention and Response
Alaska Department of Environmental Conservation

6/27/97
Date

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LIST OF ILLUSTRATIONS

LIST OF ACRONYMS

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
ADOT&PF	Alaska Department of Transportation and Public Facilities
AR	Army Regulation
ARARs	applicable or relevant and appropriate requirements
Army	United States Army
AS	air sparging
AWQS	Alaska Water Quality Standards
BGS	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
DCE	dichloroethylene
DDD	dichlorodiphenyldichloroethane
DDT	dichlorodiphenyltrichloroethane
DRMO	Defense Reutilization and Marketing Office
DRO	diesel-range organics
EPA	United States Environmental Protection Agency
FFA	Federal Facility Agreement
GPR	ground-penetrating radar
GRO	gasoline-range organics
IRA	Interim Remedial Action
MCLs	maximum contaminant levels
mg/kg	milligrams per kilogram (ppm)
MUS	Municipal Utility System
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
OU	Operable Unit
O&M	operation and maintenance
PCBs	polychlorinated biphenyls
POLs	petroleum, oil, and lubricants
PSE	Preliminary Source Evaluation
RA	Risk Assessment
RAB	Restoration Advisory Board
RAOs	remedial action objectives
RBCs	risk-based concentrations
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
SVE	soil vapor extraction
SVOCs	semivolatile organic compounds

List of Acronyms (Cont.)

TBC	to-be-considered requirement
the agencies	U.S. Army Alaska, United States Environmental Protection Agency, and Alaska Department of Environmental Conservation
UCL	upper confidence limit
USC	United States Code
USTs	underground storage tanks
VOCs	volatile organic compounds

DECISION SUMMARY

RECORD OF DECISION
for
OPERABLE UNIT 1
FORT WAINWRIGHT
FAIRBANKS, ALASKA

This decision summary provides an overview of the problems posed by the contaminants at Fort Wainwright, Operable Unit 1. This summary describes the physical features of the site, the contaminants present, and the associated risks to human health and the environment. The summary also describes the remedial alternatives considered, provides the rationale for the remedial actions selected, and states how the remedial actions satisfy the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 statutory requirements.

The Army completed a Remedial Investigation (RI) to provide information regarding the nature and extent of contamination of soil and groundwater. A Baseline Risk Assessment was developed and used in conjunction with the RI to determine the need for remedial action and to aid in the selection of remedies. A Feasibility Study was completed to evaluate remedial options.

1.0 SITE DESCRIPTION

1.1 SITE LOCATION AND DESCRIPTION

Fort Wainwright occupies 918,000 acres on the east side of Fairbanks, Alaska. Fort Wainwright includes the main post area, a range complex, and two maneuver areas. Fort Wainwright originally was established in 1938 as a cold-weather testing station. During World War II, it served as a crew and supply transfer point for the United States' Lend-Lease program to the Soviet Union. After the war, it became a resupply and maintenance base for the remote Distant Early Warning sites, an experimental station in the Arctic Ocean, and the Nike Hercules missile sites located in Interior Alaska. In 1961, all operations were transferred to the United States Army.

Primary missions at Fort Wainwright include training of infantry soldiers in the arctic environment, testing of equipment in arctic conditions, preparation of troops for defense of the Pacific Rim, and rapid deployment of troops worldwide. On-site industrial activities include the operation, maintenance, and repair of fixed-wing aircraft, helicopters, tactical and nontactical vehicles, weapon systems, and general support activities. The activities also include power generation; steam heat production; drinking water production, treatment, and distribution; and standby power and water production.

The scope of Operable Unit 1 (OU-1) was to initiate investigation at suspected source areas that did not have adequate information to confirm or disprove the existence of contamination. These suspected source areas were identified based on limited historic information and were evaluated through a Preliminary Source Evaluation (PSE) process. The PSE process is a two-phase approach involving historical review and, if necessary, a limited field investigation. For source areas that needed more thorough evaluations, a Remedial Investigation (RI) was conducted. During an RI, information is gathered through a field investigation at each source area to determine the nature and extent of contamination and the potential human health and ecological risks associated with that contamination. When the RI is complete, a Feasibility Study is written to evaluate various site cleanup alternatives based on information collected during the RI. All of the cleanup alternatives in the Feasibility Study then are reviewed by the Army, the Alaska Department of Environmental Conservation (ADEC), and the United States Environmental Protection Agency and are evaluated against nine criteria that were established by the National Oil and Hazardous Substances Pollution Contingency Plan. An RI was conducted for source areas that needed more thorough evaluations: the 801 Drum Burial Site, Building 2077, Building 1599, and Site N-4 (see Figures 1-1 and 1-2). The 801 Drum Burial Site is the only OU-1 source area recommended for remedial action under this Record of Decision (ROD). The Army and ADEC have a cooperative agreement to address petroleum-contaminated source areas. Two source areas, Buildings 1599 and 2077, are being addressed under this agreement because the contaminants of concern at these source areas are petroleum-related. These source areas do not require any further action under this ROD. Site N-4 did not have contaminant detections above protective human-health-based levels and is recommended for no further action under this ROD.

In August 1995, the Chemical Agent Dump Site underwent an Interim Remedial Action (IRA) to remove any remaining chemical warfare material from the source area. The IRA proved that the source area did not have chemical warfare materials buried on site, nor were there any other contaminants of concern in the soil or groundwater. A complete record of this removal action and its findings are included in the Fort Wainwright Administrative Record. This source area also is

recommended for no further action under this ROD.

The no-further-action decision was made for each source area if: 1) the physical location could not be identified or located in the investigation, 2) no visible sign of contamination was observed during the source area inspection, or 3) environmental sampling results showed that contamination is present at levels below the protective human-health-based levels. Based on this decision process, the remaining suspected source areas are recommended for no further action under this ROD: Site N-4, the Utilidor Expansion Drum Site, the Beacon Tower Landfill, the Blair Lakes Drum Site, Building 3015, Burial Site M, the Building 1128 Transformer Storage Yard, the Trainor Gate Railroad Spur, the Runway Radioactive Waste Site, the Birch Hill Radioactive Waste Site, Building 1567, the Transformer Storage Yard East of Building 3019, the Alaska Railroad Storage Yard, Building 2250, the Drum Site South of the Landfill, and the Engineers Park Drum Site. The Motor Pool Buildings and the Former Explosive Ordnance Detonation (EOD) Range will be addressed through the OU-5 decision process. No analysis of remedial alternatives was conducted for these suspected source areas. A description of the no-further-action decisions can be found in the Administrative Record (see Figures 1-1 and 1-2).

Nine of the OU-1 source areas are located within the Ladd Field National Historic Landmark/District: Building 1128, Building 1567, Building 1599, Building 2077, the Building 3019 Transformer Storage Yard, the Trainor Gate Railroad Spur, the Alaska Railroad Storage Yard, the Runway Radioactive Waste Site, and the Blair Lakes Drum Site. However, the Fort Wainwright Historical Preservation Officer has determined that none of the source areas are "contributing elements to the national landmark" and as such do not require additional consultations as described in Section A106 of the National Historic Preservation Act. He also has determined that because of the temporary nature of the remediation systems, consultation will not be required for the installation, operation, and implementation of remedial actions. The Blair Lakes Drum Site is considered an archaeological site because artifacts were found in "largely undisturbed, multi-component prehistoric sites."

The Chena River flows through Fort Wainwright and the City of Fairbanks into the Tanana River. Figures 1-1 and 1-2 illustrate the entire installation and each source area's location. All the source areas are in a 500-year floodplain, except for the 801 Drum Burial Site, which is in a 100-year floodplain. No threatened or endangered species reside in the area.

1.1.1 801 Drum Burial Site

The 801 Drum Burial Site is approximately 0.13 mile east of the 801 Military Housing Area on the east side of River Road and near the west bank of the Chena River (see Figures 1-1 and 1-3). The 801 Drum Burial Site is undeveloped and vegetated with grass, brush, and trees. The area is in a small depression between River Road and the Chena River. Surface water tends to pond at the source area during spring thaw. Soil at the source area varies from silty sand and gravel to clean sand and gravel. Groundwater is shallow, varying from 5 feet to 15 feet below ground surface (BGS) in the on-site wells. The groundwater flow direction and gradient at the source area and the flow stage of the Chena River fluctuate seasonally. During periods of high flow stage, the groundwater flow direction is west. The flow direction during winter and early spring (low flow stage) is generally east-northeast toward the river. The hydraulic gradient at the source area is approximately 3 feet per mile. This relatively flat gradient is highly variable and causes a great degree of uncertainty in flow direction.

This source area was used as a drum storage area and disposal site. The drums historically contained diesel fuel, gasoline, jet fuel, solvents, asphalt, pesticides, and lubricants. Aerial photographs from the 1950s through 1960s show a gravel pit in the southwest corner of the storage pad. Subsequent aerial photographs from 1974 show that the pit had been filled. Ninety-two drums were removed from this source area in 1992. In 1995, 34 drums were removed from the excavation. Because it was apparent after the drum excavation that numerous drums remained, two geophysical surveys were performed. The surveys revealed eight areas of anomalies. In 1996, 118 drums were removed from the areas identified in the geophysical surveys.

1.2 GENERAL SOILS AND GEOLOGY

Fort Wainwright is located in central Alaska near the north side of the Tanana River Valley, within the Tanana-Kuskokwim Lowlands. Fort Wainwright is located near the base of the low rolling hills of the Yukon-Tanana Uplands. The uplands are northwest-tending and lie between the Yukon and Tanana Rivers. The regional bedrock consists of a Precambrian and Paleozoic metamorphic complex of gneiss and schist that has been intruded extensively by igneous rocks of Mesozoic to Tertiary Age. The lowland basin consists of a thick sequence of Quaternary deposits above the metamorphic basement. The Quaternary deposits include glacial outwash and fluvial sediments. Most of Fort Wainwright is within the lowlands of the Tanana River floodplain. The lowlands consist of alluvial floodplain deposits of sand and gravel with generally less than 10% silt and an overlying fine-grained surface soil up to 5 feet thick. The unconsolidated alluvial floodplain deposits consist of varying proportions of sand and gravel that are commonly layered, and range in thickness from 10 feet to more than 400 feet before encountering bedrock.

1.3 GENERAL HYDROGEOLOGY AND GROUNDWATER USE

The main aquifer in the Fort Wainwright area is the Tanana Basin alluvial aquifer in a buried river valley. This aquifer ranges from a few feet thick at the base of Birch Hill to at least 300 feet thick under the fort's main cantonment area. The aquifer may reach 700 feet in the Tanana River Valley. Groundwater in the Tanana-Chena floodplain generally is considered to be unconfined in permafrost-free areas. A confined aquifer may develop seasonally where the depth to the water table is less than the depth of the seasonal frost penetration.

The regional groundwater flow direction is generally west-northwest, similar to the flow of the Chena and Tanana Rivers. The Chena River flows through Fort Wainwright and the City of Fairbanks into the Tanana River. The Tanana River boarders the southern portion of Fort Wainwright. Flow fluctuates seasonally because of the effects of changing river stages in the Tanana River and, to a lesser extent, in the Chena River. Groundwater levels occur between 5 feet and 15 feet BGS near the Chena River and can fluctuate greatly because of river stage and interactions with the Tanana River. Groundwater flow direction also fluctuates dramatically for the same reason. The intensity and length of these fluctuations depend on how fast the river stage changes and the cause of the change. Hydrogeologic conditions at the 801 Drum Burial Site are also difficult to characterize because of the source area's proximity to the Chena River.

The aquifer generally recharges the Chena River (i.e., groundwater flows into the river) when the river stage is low, which occurs during the low precipitation periods of late fall through late winter and mid-summer to early fall. The Chena River recharges the aquifer (i.e., groundwater flows from the river into the surrounding aquifer) during the high river stage, which occurs during the high

precipitation periods and spring snowmelt, generally from early fall through mid-fall and from early spring through early summer.

Existing data suggest that the contaminant plumes in the groundwater are migrating from the known source areas; however, migration rates cannot be determined at this time. Existing data also suggest a high potential for the contaminants to migrate to the Chena River and affect downgradient groundwater users. Fate and transport calculations were based on the predominant flow patterns in order to provide a scenario that was reasonable and protective of human health and the environment.

Where present, permafrost forms discontinuous confining layers that influence groundwater movement and distribution. The presence of near-surface permafrost usually retards groundwater movement within the shallow subsurface.

Groundwater is the only source of potable water used at Fort Wainwright and the Fairbanks area. Most of Fort Wainwright's potable water supply comes from two large-capacity wells located west of the Post Power Plant. Fort Wainwright facilities not connected to the post water system are serviced by individual wells. In addition to the main production well, standby supply wells are located throughout Fort Wainwright to provide large quantities of chlorinated, unfiltered water to the main drinking water system in the event of a catastrophic fire or similar emergency.

The City of Fairbanks Municipal Utility System (MUS) uses this same aquifer and has four wells located 1 mile downgradient of the post's boundaries, on the banks of the Chena River. These wells serve as the main supply for most of the population of the City of Fairbanks. The four MUS wells are completed at depths approximately 90 feet BGS and pump 5 million gallons per day. Some nonmilitary residents north of the Chena River obtain drinking water from the City of Fairbanks MUS wells; however, in this area there are residential and commercial wells that provide residential and bottled drinking water, respectively. Residents of the 801 Military Housing Area obtain their drinking water from the City of Fairbanks water system.

1.4 LAND USE

The land under the OU-1 source areas was withdrawn from the public domain for military purposes by Executive Order. U.S Army Alaska holds no deed documents to the land.

Current land use for all the OU-1 source areas, except the 801 Drum Burial Site, is industrial. Although the 801 Drum Burial Site is adjacent to a housing unit, the current land use is considered recreational. Access to the 801 Drum Burial Site currently is unrestricted; however, the main areas under current investigation have been surrounded by an orange construction fence and designated as a contaminated area with signs since intrusive investigations began.

The Tanana Basin alluvial aquifer is the main aquifer that provides approximately 95% of all drinking water for Fort Wainwright, Fairbanks, and surrounding areas. Even though domestic water use does not occur at the OU-1 source areas, all source areas are hydrogeologically connected to the main aquifer.

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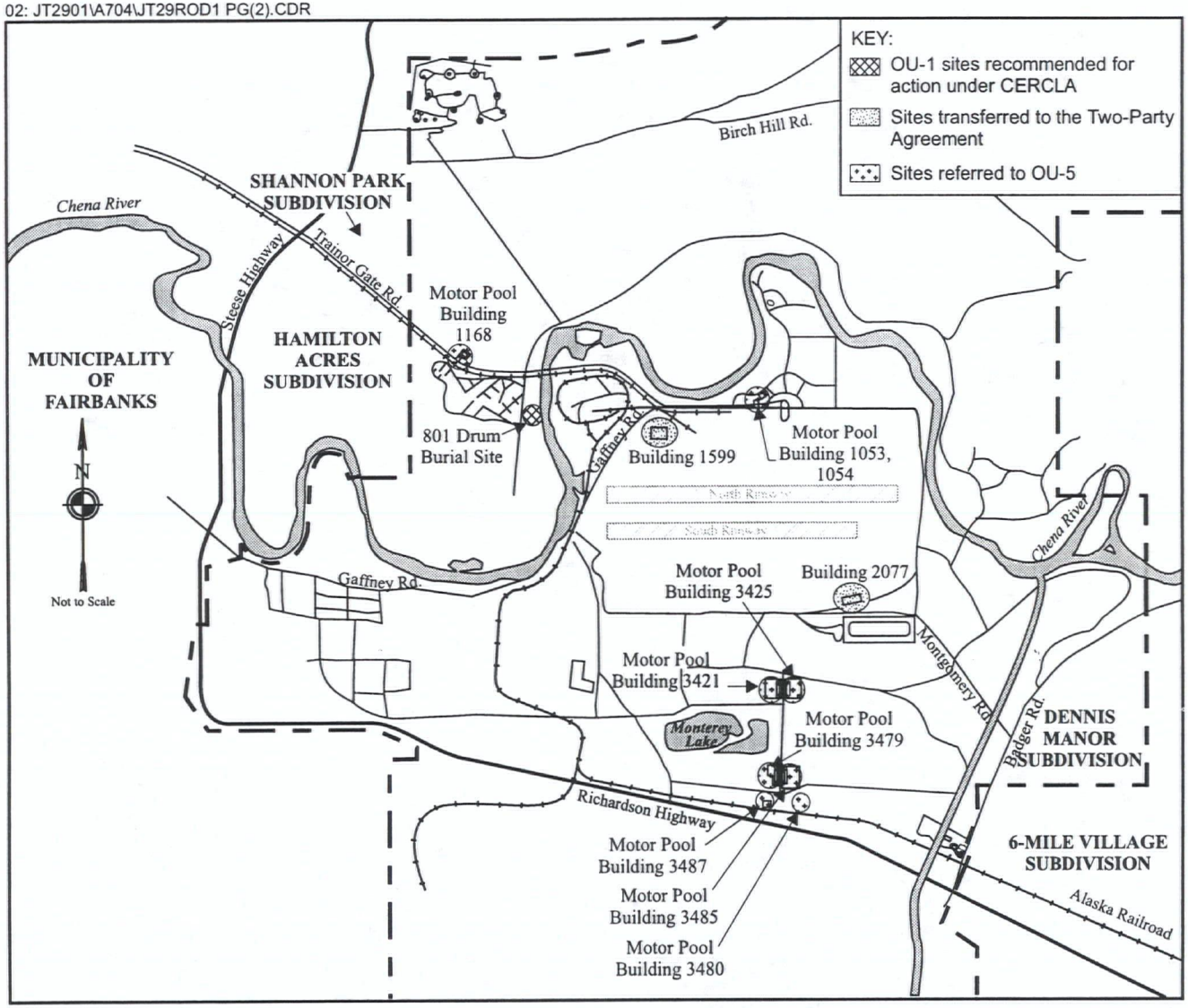

Figure 1-1 SOURCE AREA LOCATION MAP, SITES REQUIRING FURTHER ACTION OPERABLE UNIT 1, FAIRBANKS, ALASKA

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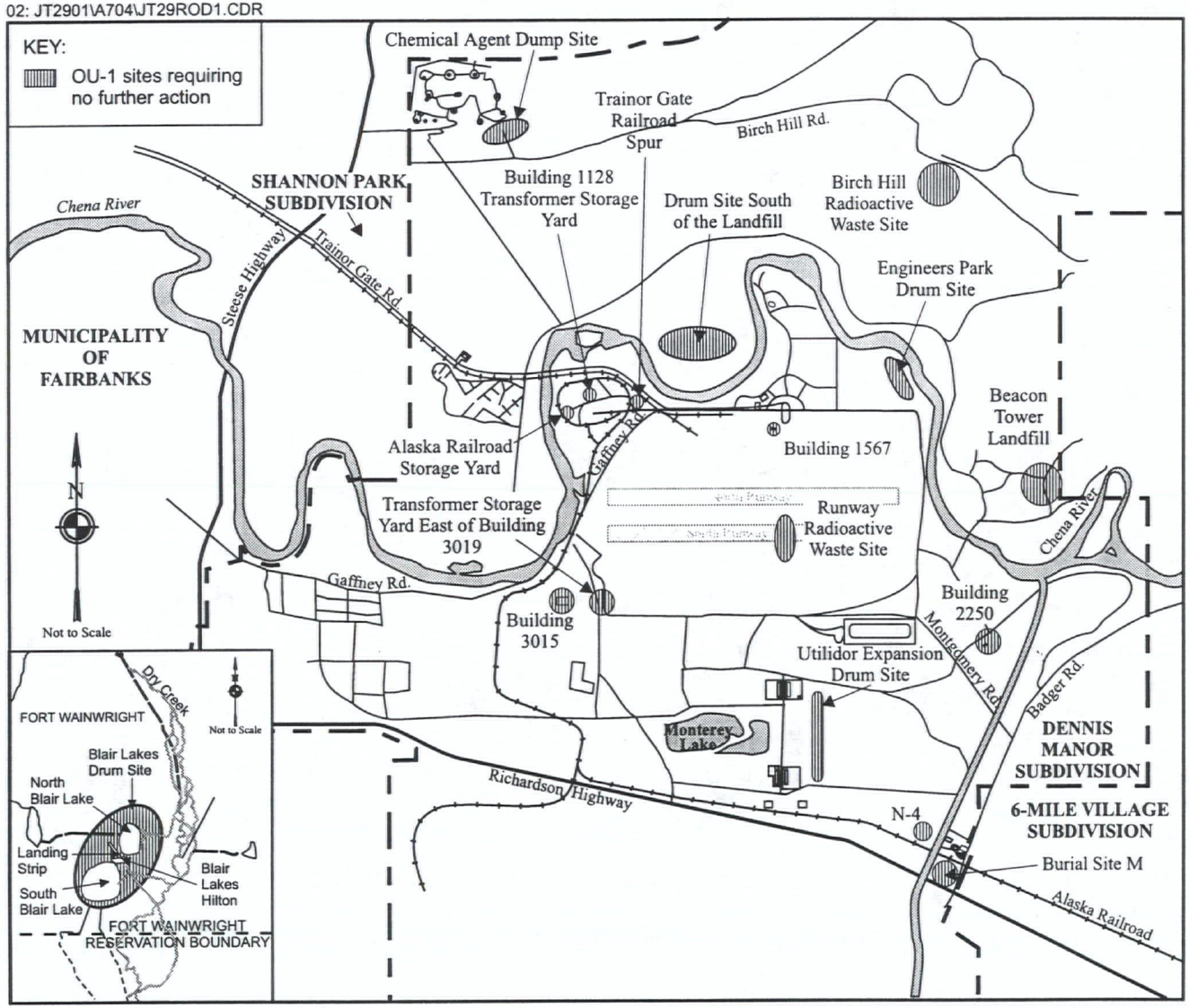

Figure 1-2 SOURCE AREA LOCATION MAP, SITES REQUIRING NO FURTHER ACTION OPERABLE UNIT 1, FAIRBANKS, ALASKA

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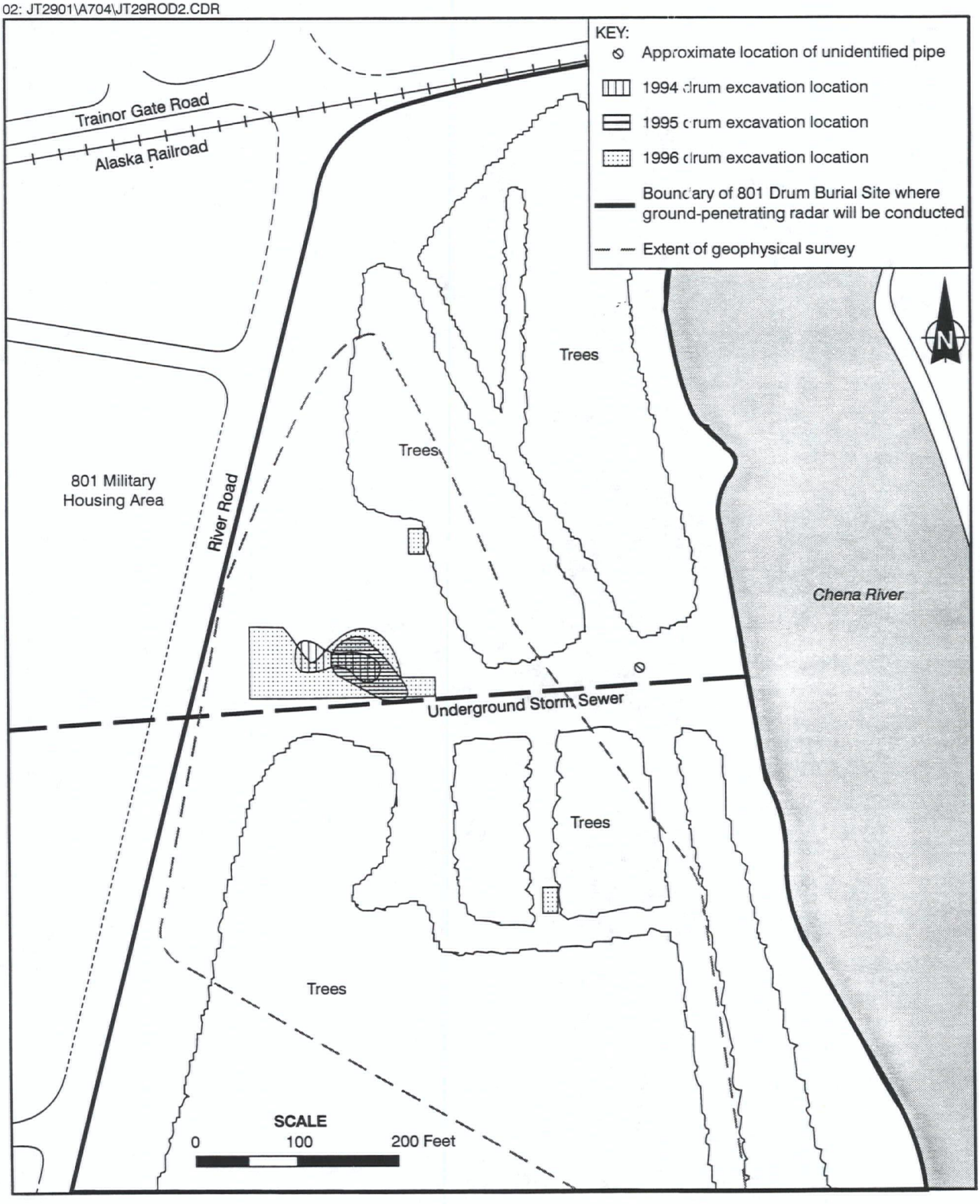


Figure 1-3 SOURCE AREA LOCATION MAP, 801 DRUM BURIAL SITE OPERABLE UNIT 1, FAIRBANKS, ALASKA

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.1 SITE HISTORY

The suspected source areas associated with Operable Unit 1 (OU-1) have limited available documents describing past practices, but all OU-1 suspected source areas were evaluated through Preliminary Source Evaluations (PSEs) that included record searches; interviews; and, if warranted, limited field investigations. For source areas that needed more thorough evaluations, a Remedial Investigation (RI) was conducted. In 1995, an RI was conducted for the following four OU-1 suspected source areas:

- 801 Drum Burial Site,
- Building 2077,
- Building 1599, and
- Site N-4.

A Feasibility Study (FS) was conducted for the 801 Drum Burial Site.

In August 1995, the Chemical Agent Dump Site underwent an Interim Remedial Action (IRA) to remove any remaining chemical warfare material from the source area. The IRA proved that the source area did not have chemical warfare materials buried on site, nor were there any other contaminants of concern in the soil or groundwater. A complete record of this removal action and its findings are included in the Fort Wainwright Administrative Record. This source area also is recommended for no further action under this Record of Decision (ROD).

Nine of the OU-1 source areas are located within the Ladd Field National Historic Landmark/District: Building 1128, Building 1567, Building 1599, Building 2077, the Building 3019 Transformer Storage Yard, the Trainor Gate Railroad Spur, the Alaska Railroad Storage Yard, the Runway Radioactive Waste Site, and the Blair Lakes Drum Site. However, the Fort Wainwright Historical Preservation Officer has determined that none of the source areas are "contributing elements to the national landmark" and as such do not require additional consultations as described in Section A106 of the National Historic Preservation Act. He also has determined that because of the temporary nature of the remediation systems, consultation will not be required for the installation, operation, and implementation of remedial actions. The Blair Lakes Drum Site is considered an archaeological site because artifacts were found in "largely undisturbed, multi-component prehistoric sites."

2.1.1 Source Area Requiring Action Under Comprehensive Environmental Response, Compensation, and Liability Act

2.1.1.1 801 Drum Burial Site

The 801 Drum Burial Site formerly was used as a drum storage area and disposal area. The drums historically have contained diesel fuel, gasoline, jet fuel, solvents, asphalt, pesticides, and lubricants. Aerial photographs from the 1950s and 1960s indicate that a pit was in the southwest corner of the storage area. Subsequent aerial photographs show that the pit was filled. During summer 1992, buried drums were found during construction of the storm sewer that runs west-east through the

source area and outfalls in the Chena River. Numerous drums were removed during these construction activities.

PSEs were conducted in 1991 and from 1992 through 1993. As a result of the PSEs and several geophysical surveys, 92 drums were removed from this source area in September 1992; 34 drums were removed in 1995.

The RI found that pesticides, such as dichlorodiphenyltrichloroethane (DDT) and dieldrin, were present in surface soils at the 801 Drum Burial Site. DDT was found in an area of mature vegetation. Petroleum-based compounds, and pesticides such as dieldrin, aldrin, and DDT, were detected in subsurface soil mainly in the area where drums were excavated. Groundwater analytical results indicate that benzene, pesticides, solvents, and metals were present in groundwater.

A large-scale geophysical survey was performed in May 1996 to further delineate the presence of buried drums. An additional 118 drums were removed. The condition and content of the excavated drums varied; the drums contained fuels, solvents, pesticides, and lubricants. Based on the 1996 excavation and interviews with post employees, there still is a potential for additional buried drums.

In 1996, approximately 850 cubic yards of contaminated soil associated with the drum removal was excavated and stockpiled. Analytical results from soil collected from the excavation indicate that the area is contaminated with pesticides, metals, and diesel-range organics (DRO). U.S. Army Alaska will move these soils to an area away from the housing complex to conduct a Treatability Study to determine whether an innovative technology called *rhizosphere-enhanced phytoremediation* can reduce the contaminants of concern and allow the soils to be disposed of in the Fort Wainwright Landfill. This study will attempt to exploit the chemical and biological processes that occur in the root-soil interface zone (rhizosphere) of certain plants between the microbial communities in the soil and the plant root systems. This study, if successful, will save the government several million dollars in shipping and disposal costs for this soil. The 1996 analytical results also indicate that groundwater is contaminated with volatile organic compounds (VOCs), pesticides, and metals (see Appendix A).

2.1.2 Source Areas Transferred to Other Operable Units

Following are descriptions of the OU-1 source areas that have been referred to other OUs (see Figure 1-1).

2.1.2.1 Motor Pool Buildings

The Motor Pool Buildings (1053, 1054, 1168, 3015, 3421, 3425, 3479, 3480, 3485, and 3487) were referred to OU-5. OU-5 is the comprehensive OU for Fort Wainwright. Two motor pool source areas are located within OU-5 source areas. Minimal amounts of petroleum, oil, and lubricants (POLs) and solvents were stored at the Motor Pool Buildings. Investigations included analyses for these materials. Because the Motor Pool Buildings are being addressed as one source area, they can be investigated more effectively in OU-5.

2.1.2.2 Former Explosive Ordnance Detonation Range

The Army and Air Force reportedly used the Former Explosive Ordnance Detonation Range as an open burn/open detonation site for disposing of unexploded ordnance, unused propellants, rocket

motors, and small-arms munitions from the 1950s through 1974. This source area is located close to the open burn/open detonation area originally listed in OU-5. Therefore, it can be addressed more effectively in OU-5.

2.1.3 Source Areas Referred to the Two-Party Agreement

2.1.3.1 Building 1599

The former location of Building 1599 is north of Taxiway 18 on Front Street and approximately 0.14 mile south of the Chena River (see Figure 1-1). Built in 1942, Building 1599, also identified as *Building T-106*, was originally the Facilities Engineer Maintenance Shop. It was a 60-foot by 180-foot wood-framed building with a concrete foundation. The building was destroyed intentionally in a fire training exercise in 1984. Only the remnants of the concrete foundation remain buried beneath a 6-inch gravel pad. A 6-inch-diameter wood stave sanitary sewer pipe is adjacent to the former building and ends at the Chena River. Past practices at Building 1599 include automobile and heavy equipment maintenance, and pesticide mixing and storage. As-built drawings from 1943 show a welding shop, body shop, warm storage area, light and heavy equipment repair area, lubrication and service room with a grease pit, and wash rack equipped with a sand trap floor drain. A 3-inch pipe is shown on the as-built drawings, extending from the floor drain in the wash rack area to a manhole in the lubrication and service room, where it passes through a grease trap and out of the building into a septic tank.

Past practices in Building 1599 vicinity also included dispensing diesel and gasoline from the West Quarter Master Refueling Point. A truck unloading stand was approximately 300 feet north of Building 1599. Pesticide storage and mixing reportedly occurred in the building before 1973. No records of hazardous waste storage in the Building 1599 vicinity exist.

An RI conducted in 1995 focused on surface soil contamination at Building 1599. DRO, gasoline-range organics (GRO), dioxins, and pesticides were detected in surface soil adjacent to and south of the former building. A Baseline Risk Assessment (RA) was conducted for this source area. Excess lifetime cancer risks for the source area are within the acceptable risk range for current and future exposure scenarios for an industrial area. The noncancer risks were below a hazard index of 1. The results of the RA are summarized in Table 2-1. Based on the results of the RA, no further action is needed for the pesticide-contaminated soil under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). For a more detailed explanation of risk concepts, see Section 4.

Table 2-1

SUMMARY OF RISKS AND HAZARD QUOTIENTS FOR SITE N-4, BUILDING 1599, AND BUILDING 2077
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA

RI Sites	Residential Scenario		Industrial Scenario[a]		Recreational Scenario	
	Risk	HQ	Risk	HQ	Risk	HQ
Site N-4 (NFA)	3×10^{-7}	0.0045	9×10^{-8}	0.0016	6×10^{-9}	6×10^{-6}
Building 1599 (Two-Party)	4×10^{-5}	0.21	1×10^{-5}	0.073	1×10^{-6}	0.002
Building 2077 (Two-Party)	1×10^{-4}	0.74	3×10^{-5}	0.013	5×10^{-7}	0.002

a Industrial scenario is current and the most likely future land use scenario.

Key:

HQ = Hazard quotient.
NFA = No further action.
RI = Remedial investigation.

Because petroleum contamination was found at levels exceeding Alaska Department of Environmental Conservation (ADEC) cleanup levels, Building 1599 has been referred to the Two-Party Agreement. The Army intends to initiate institutional controls, such as land and groundwater use restrictions, and annotation in the Fort Wainwright Master Plan to ensure proper handling and management of the soil at this source area.

2.1.3.2 Building 2077

Building 2077, also referred to as *Hangars 7 and 8*, is located near the southeast corner of the flight line on Montgomery Road (see Figure 1-1). Building 2077 has been used for aircraft maintenance since it was built in 1958. A paint booth was added along the west end of the building in 1973. Solvents were used for aircraft maintenance and paint shop operations. The source area includes the asphalt that skirts Building 2077 and the apron to the airstrip, but does not include the building itself.

Past practices at Building 2077 may have included dumping and/or burning waste paint chips outside, along the northwest end of the building. Before 1989, spent solvents were generated regularly. These materials, as well as used oil and contaminated fuels, were placed in 55-gallon drums and stored outside near the east end of the building. The drums were not overpacked or labeled, and rested directly on the ground. Since 1989 and before initiation of the PSEs, the drums stored outside Building 2077 were tested, identified, and disposed of. After the drums were removed, the stained soil beneath the area was excavated and overpacked for disposal.

A PSE and RI were conducted at Building 2077 to investigate reports of spills and groundwater contamination. Petroleum hydrocarbons, including DRO; GRO; and benzene, toluene, ethylbenzene, and total xylenes, were detected in surface and subsurface soils to a maximum depth of 10 feet below ground surface (BGS) during the 1995 RI. Petroleum-related compounds also were detected in surface soil from 2 feet to 3 feet BGS along the edge of the pavement. Surface and subsurface petroleum contamination exceed Alaska soil cleanup levels. Petroleum contamination was detected at concentrations exceeding state drinking water levels in groundwater wells adjacent to and downgradient of the source area. Benzene was detected in two wells during the RI. Solvent-related compounds were not detected in soil or groundwater during the RI.

A Baseline RA was conducted for this site. Excess lifetime cancer risks for the source area are within the acceptable risk range for current and future exposure scenarios. The noncancer risks were below a hazard index of 1. The results of the RA are in Table 2-1. Based on the results of the RA, no further action is needed under CERCLA.

This source area has been referred to the Two-Party Agreement because the contaminant of concern is petroleum. Under the Two-Party Agreement, the Army intends to remediate the soil and groundwater contamination by installing a soil vapor extraction and air sparging system.

2.1.4 Source Areas Requiring No Further Action

The analytical results from the PSEs and the 1995 RI are compared to conservative screening values known as *risk-based concentrations (RBCs)* to aid in determining whether a source area requires further action. The no-further-action decision was made for each source area if: 1) the source area could not be identified or located in the investigation, 2) no visible sign of contamination was observed during the source area inspection, or 3) environmental sampling results showed that contamination is present at levels below the protective human health risk-based levels. Source areas requiring no further action are shown in Figure 1-2.

2.1.4.1 Site N-4

Site N-4, formerly named *Drum Site West of DRMO*, is a 650-foot by 700-foot area approximately 400 feet west of the Defense Reutilization and Marketing Office (DRMO) salvage yard and 200 feet north of the Old Richardson Highway (see Figure 1-2). The source area originally was identified as a potential source of contamination based on a review of a 1967 aerial photograph. Site N-4 was designated as a motorpool and automotive maintenance shop in the 1950s. The motorpool reportedly used solvents, oils, and fuels in its operation. In 1961, the Army turned the area into a landfill and operated it as such until the early 1970s. The landfill reportedly was used to dispose of solid materials such as porcelain products, refrigerators, ranges, and signposts.

Several investigations have been conducted at Site N-4 to review historical activities at the source area and to evaluate the potential presence of soil and groundwater contamination at the source area based on its past use as a landfill. An RI was conducted in 1995 to determine the extent of lead contamination in surface and subsurface soil. Samples collected during the RI contained contaminant levels below naturally occurring levels for the area, RBCs, or applicable or relevant and appropriate requirements. Groundwater samples were analyzed to determine whether the landfill operations impacted groundwater quality at this location. Analytical results detected very low levels of solvent in two samples during one sampling event.

A Baseline RA was conducted for this source area. Excess lifetime cancer risks for the source area are within the acceptable risk range for current and future exposure scenarios. The noncancer risks were below a hazard index of 1. The results of the RA are summarized in Table 2-1. Based on the results of the RA, no further action is needed under CERCLA.

Based on the results of the RI and RA, the Army, ADEC, and the United States Environmental Protection Agency (EPA) have recommended no further action for Site N-4. A description of the no-further-action decision can be found in the Administrative Record.

2.1.4.2 Utilidor Expansion Drum Site

The Utilidor Expansion Drum Site is located along the utilidor section identified as *A-line*, north of Building 3496 (see Figure 1-2). The source area originally was named *FWA 022* in 1987 when metal debris (i.e., several exposed and buried drums) was discovered during construction of a utilidor. Excavation operations removed debris from the immediate vicinity of the utilidor corridor (approximately 900 square feet).

A 1992 PSE, which included interviews and a source area visit, revealed that past metal disposal practices included filling a depression with nonhazardous construction debris. Three individuals that had first-hand knowledge of the source area indicated that the drums were unmarked, empty, and rusted. In addition, they reported that no evidence of contamination was apparent at the suspected source area, other than some rust-stained soil adhering to the drums. Historically, it was a common practice to fill any depression at Fort Wainwright with nonhazardous construction debris.

The PSE concluded that based on the reported condition of the drums, it was assumed that little or no contents remained in them. Furthermore, even if a release had occurred, for which there is no evidence, it likely occurred 30 to 40 years ago and would be difficult to document or find at this point.

The PSE results indicate that incidental scrap metal disposal occurred at the suspected source area, but it does not appear to be a drum burial area. No further action is recommended for the Utilidor Expansion Drum Site. A description of the no-further-action decision can be found in the Administrative Record. The Utilidor Expansion Drum Site will not be discussed further in this ROD.

2.1.4.3 Beacon Tower Landfill

The Beacon Tower Landfill reportedly is located east of the Fort Wainwright north runway on a hill in the approach/departure zone (see Figure 1-2). Before 1954, the area was identified as Army Camp No. 3 and contained three temporary structures and a beacon tower. Currently, the area is identified as Beacon Tower No. 5.

The suspected source area was identified as a potential source of contamination in 1983. The source area allegedly was used as a sanitary landfill during the 1967 Chena River flood. Landfill operations allegedly consisted of surface burning followed by burial.

The 1992 PSE included reviews of aerial photographs and site visits. The aerial photographs revealed no clear indication of waste disposal or burning activities in the area. In addition, field inspections failed to locate the landfill. A record review and a report from an anonymous person indicate that the

Beacon Tower Landfill was used as a sanitary landfill in 1967 after the Chena River flood. The report identifies a sanitary landfill containing approximately 1,000 cubic meters of refuse at the Beacon Tower Landfill. Based on this report, landfill operations consisted of burning waste followed by burial. If the Beacon Tower Landfill had been used for a landfill, the activities appeared to have occurred for a short time more than 25 years ago.

If Army Camp No. 3 was constructed similarly to other Army camps, the structures were barracks, a maintenance shop, and a generator building. The type and quantity of hazardous wastes from a camp of this nature would not be expected to be significant.

Based on the findings of the PSE, the Army, ADEC, and EPA concluded that insufficient evidence existed to consider the Beacon Tower Landfill a potential source of contamination; therefore, the source area is recommended for no further action. A description of the no-further-action decision can be found in the Administrative Record. The Beacon Tower Landfill will not be discussed further in this ROD.

2.1.4.4 Blair Lakes Drum Site

The Blair Lakes Drum Site is in the Tanana Flats Training Area, approximately 35 miles southeast of the Fort Wainwright main cantonment area (see Figure 1-2). The suspected source area consists of North and South Blair Lakes; a 3,000-foot by 60-foot dirt and grass runway and taxiway; a small group of interconnected, wood-framed Quonset huts; eight archaeological sites; and the surrounding uplands and lowlands.

Since the early 1940s, the United States Department of Defense used the Blair Lakes Drum Site as a remote materials and weapons testing facility, recreational camp, Air Force bombing range, and Army small arms range.

A limited investigation was conducted in 1986. Surface water, sediment, and drum content samples were collected. Surface water and sediment samples were analyzed for VOCs, semivolatile organic compounds (SVOCs), total cyanide, total phenols, and metals. No analytes were detected in water samples; however, cyanide and metals were detected in the sediment samples. Drum content samples contained petroleum products.

In August 1987, 1,618 empty and 48 full 55-gallon drums, two fuel storage tanks, and 15 yards of miscellaneous debris were removed from the source area. The remaining debris was landfilled in a permitted area located west of the runway and north of South Blair Lake.

Analytical results from a 1993 PSE reported DRO at four locations, with one sample exceeding the ADEC cleanup level. Low levels of pesticide contamination were detected in soil. These levels were within the acceptable risk range specified in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Additionally, the Army Environmental Hygiene Agency, in conjunction with project managers, completed an ecological evaluation of pesticide concentrations and concluded that DDT concentrations presented no significant risks to fish, wildlife, or the ecosystem.

Based on the 1993 PSE and ecological evaluation at this suspected source area, there is no evidence of a continuing source of contamination that poses an unacceptable risk to human health or the environment. Therefore, the Army, ADEC, and EPA have recommended the Blair Lakes Drum Site

for no further action. A description of the no-further-action decision can be found in the Administrative Record. The Blair Lakes Drum Site will not be discussed further in this ROD.

2.1.4.5 Burial Site M

Burial Site M is located along the eastern reservation boundary, south of Badger Road and the Alaska Railroad tracks, and southwest of the DRMO (see Figure 1-2). Burial Site M was the suspected source of petroleum and pesticide contamination found in soil samples collected along the western boundary of the DRMO during a State of Alaska Department of Transportation and Public Facilities (ADOT&PF) preconstruction field sampling event for a road widening project on Badger Road in 1991. The United States Army Toxic and Hazardous Materials Agency attributed the sample results to Burial Site M, but the report failed to provide a reference to where the original samples were collected.

In 1992, a PSE was conducted. Interviews did not identify anyone aware of hazardous waste disposal at this location. A records search included review of historical information and aerial photographs for this location. In 1994, ADOT&PF expanded Badger Road as designed. Soil samples from the road construction adjacent to the source area did not detect any contaminants of concern above RBCs. No evidence exists to indicate that any contaminants were released from this location. As a result, it was concluded that the attribution of contamination to Burial Site M was in error. The Army, ADEC, and EPA have recommended no further action at Burial Site M. A description of the no-further-action decision can be found in the Administrative Record. Burial Site M will not be discussed further in this ROD.

2.1.4.6 Building 1128 Transformer Storage Yard

Building 1128 is one of three adjacent warehouses near the Railcar Off-Loading Facility, located north of Gaffney Road (see Figure 1-2). Transformers have been stored in the transformer storage yard, located east of Building 1128, since the 1980s.

The Building 1128 Transformer Storage Yard originally was identified as a potential source of contamination in 1990. A PSE was conducted in 1992. No one interviewed during the PSE reported any knowledge of a release at this suspected source area. A review of aerial photographs from 1948 through 1990 confirmed that there is no evidence of a release at the location. Analytical results from the PSE indicated that no polychlorinated biphenyls (PCBs) were released at the source area. An ADEC visual inspection in 1992 confirmed that no evidence of a release from the storage yard exists. Spill records were provided routinely to ADEC during this time period; however, ADEC has no record of a spill being reported at this source area during this time.

Based on the results of the PSE and the ADEC inspection, it was determined that the Building 1128 Transformer Storage Yard does not pose a threat to human health and the environment. Therefore, the Army, ADEC, and EPA have recommended no further action for the Building 1128 Transformer Storage Yard. A description of the no-further-action decision can be found in the Administrative Record. The Building 1128 Transformer Storage Yard will not be discussed further in this ROD.

2.1.4.7 Trainor Gate Railroad Spur

The Trainor Gate Railroad Spur is between the Chena River bridge and Gaffney Road, east of the

Alaska Railroad Storage Yard (see Figure 1-2). The source at this source area, identified in 1987, was reportedly adjacent to the railroad spur, at the former location of a warehouse and loading dock where solvent reportedly was dumped off the loading dock.

A PSE was conducted for the Trainor Gate Railroad Spur in 1992. Interviews conducted during the PSE revealed that a small quantity of a solvent used for typewriter cleaning and repair was dumped off the loading dock at the north end of the building during 1954 and 1955. No other historic releases of solvents have been reported at this source area. This suspected source area is not likely to pose a threat to human health and the environment because most contaminants would have volatilized during the dumping process; the area has experienced several flooding events from the Chena River, resulting in a significant amount of scouring and soil transport; and any remaining solvents likely were transported from this location.

Based on the results of the PSE, the Army, ADEC, and EPA have recommended no further action for the Trainor Gate Railroad Spur. A description of the no-further-action decision can be found in the Administrative Record. The Trainor Gate Railroad Spur will not be discussed further in this ROD.

2.1.4.8 Runway Radioactive Waste Site

The Runway Radioactive Waste Site reportedly is located north of Building 2104, east of vault 2112, under the Fort Wainwright south runway (see Figure 1-2). This source area originally was identified as a potential source of contamination on a 1984 map and by local hearsay. Low-level radioactive materials, such as radio tubes, airplane instruments, and watch dials, reportedly were disposed of at this suspected source area.

A PSE was conducted for the Runway Radioactive Waste Site in 1992. A review of aerial photos from 1948 to 1990 showed no evidence of excavation in the area. After completion of extensive interviews, no one with firsthand knowledge of the storage area, its contents, the types of materials stored there, or its exact location was identified. No Army records referencing a radioactive waste site in the runway locations were located. Several maps identify the source area's location; however, the locations are not consistent with each other. No evidence that a radioactive vault was constructed under the runway exists, based on the Master Plan maps from 1958 to current operations. The area was checked with a Geiger counter and scintillometer. Neither instrument revealed any radioactive readings above background. The survey concluded that there were no radioisotopes that would pose a threat to human health or the environment at the source area. No radioactive isotopes have been detected in groundwater wells downgradient from the general area.

The location identified for this contaminant source has been proven inaccurate by the PSE. The PSE results indicate that there is no risk to human health or the environment from this source area. As a result, the Army, ADEC, and EPA have recommended no further action for the Runway Radioactive Waste Site. A description of the no-further-action decision can be found in the Administrative Record. The Runway Radioactive Waste Site will not be discussed further in this ROD.

2.1.4.9 Birch Hill Radioactive Waste Site

The Birch Hill Radioactive Waste Site is located in a wooded area near the abandoned Birch Hill underground POL tank farm and south of Birch Hill (see Figure 1-2). In 1973, the source area was the subject of an article titled, "Army Discovers Old Radioactive Disposal Site" in the *Yukon Sentinel*.

According to the article, the "four foot site contained four holes 18 inches in diameter each lined with a vertical concrete drain pipe having a concrete cover." The photograph accompanying the article shows a fenced wooded area with an aboveground, square concrete bunker with four concrete covers. Interviews with individuals having institutional knowledge of Fort Wainwright confirmed the waste site's location and that a cleanup of low-level radioactive material (i.e., radium dials) took place in about 1973.

In 1992, a PSE involving a records search, interviews, and a visual inspection of the Birch Hill Radioactive Waste Site was conducted. As a result of the interviews, the source area was located. The area was checked with a Geiger counter and scintillometer. Neither instrument revealed any radioactive readings above background. The survey concluded that there were no radioisotopes that would pose a threat to human health or the environment at the source area.

No evidence proves that a potential source of contamination exists at this source area. Therefore, the Army, ADEC, and EPA have recommended no further action for the Birch Hill Radioactive Waste Site. A description of the no-further-action decision can be found in the Administrative Record. The Birch Hill Radioactive Waste Site will not be discussed further in this ROD.

2.1.4.10 Building 1567

The former location of Building 1567, a Quonset hut, was on Front Street, between Buildings 1575 and 1564 (see Figure 1-2). Building 1567 formerly was used as a Facilities Engineer Maintenance Shop in 1947, a motor vehicle storage area in 1958, a pesticide storage and mixing area in 1979, and a hazardous waste storage area in 1986. The building collapsed in 1991 because of a record snowfall and subsequently was removed.

In 1987, ADEC conducted an inspection of the pesticide storage and mixing operations at this facility. The final Resource Conservation and Recovery Act (RCRA) Facility Assessment Report (July 1990) states that exposure potential is low because pesticides found in the soil have been excavated and removed from the source area.

Soil samples were collected in 1991 during the building removal activities. The pesticide 2,4,5-T (Silex) was detected in the soil samples at concentrations within EPA's acceptable risk range. In 1994, subsurface soil samples were collected to assess the potential for vertical and horizontal migration of pesticides. Only one sample had detectable levels of pesticides, and the concentrations were within EPA's acceptable risk range.

Based on the historical record searches, interviews, and sampling results, no evidence of a contaminant release posing an unacceptable risk to human health or the environment at this source area exists. Therefore, the Army, ADEC, and EPA have recommended no further action for Building 1567. A description of the no-further-action decision can be found in the Administrative Record. Building 1567 will not be discussed further in this ROD.

2.1.4.11 Chemical Agent Dump Site

The Chemical Agent Dump Site, formerly known as the *Chemical Warfare Disposal Area*, is a 50-foot by 150-foot area at the base of Birch Hill north of the main cantonment area of Fort Wainwright and east of the Fairbanks Fuel Terminal (see Figure 1-2). The source area reportedly was used as a

burial site for containers of mustard agent and chemical agents test kits.

In 1991, a PSE was conducted for this source area. In August 1995, an interim ROD was signed by the agencies to conduct an IRA to ensure that no chemical warfare materials were buried at the source area. Soil and groundwater analytical results from the 1995 IRA indicated that chemical warfare materials and their breakdown products were not present.

Based on the results of the 1995 IRA, the Army, ADEC, and EPA agreed to a no-further-action decision for the Chemical Agent Dump Site. A description of the no-further-action decision can be found in the Administrative Record. This source area is no longer considered a contaminant source by the agencies and will not be discussed further in this ROD.

2.1.4.12 Transformer Storage Yard East of Building 3019

Building 3019 is southwest of the south runway and on the northwest corner of Meridian and Neely Roads (see Figure 1-2). The transformer storage yard, a fenced area, is located on the east side of Building 3019. Historically, the east side of Building 3019 has been used to store transformers, some of which were filled with polychlorinated biphenyls (PCBs) or PCB-containing oil.

In the early 1980s, approximately 40 PCB-containing transformers reportedly were removed. A PSE conducted in 1993 verified that PCBs were not detected above RBCs in soils. Because no PCBs were detected in the soil samples analyzed, no evidence exists of a contaminant release at the source area.

Based on the results of the PSE, the Army, ADEC, and EPA have recommended no further action for the Transformer Storage Yard East of Building 3019. A description of the no-further-action decision can be found in the Administrative Record. The Transformer Storage Yard East of Building 3019 will not be discussed further in this ROD.

2.1.4.13 Alaska Railroad Storage Yard

The Alaska Railroad Storage Yard is approximately 100 yards southwest of Building 1130, on the "inside" of the circular railroad tracks on Vest Road (see Figure 1-2). The source area was used for storage of equipment and drums containing railroad maintenance parts. Drums labeled *waste paints* and *herbicides* were inspected visually during a site visit in 1990 and contained spikes, bolts, and miscellaneous railroad maintenance parts. Historical record searches and interviews with responsible individuals verified that no significant volume of hazardous material was stored or used at this source area. Additionally, no releases of hazardous substances were reported or observed. No liquid waste was found at the source area.

Analytical results from the 1992 PSE indicated that groundwater is contaminated with POLs; however, the source of this contamination originates from sources addressed under OU-3. The groundwater contamination was assigned to the Fort Wainwright OU-3 investigation and was addressed through the OU-3 decision process.

The 1992 PSE confirmed that no hazardous waste was used or stored on site; therefore, the Army, ADEC, and EPA have recommended no further action for this source area. A description of this decision can be found in the Administrative Record. The Alaska Railroad Storage Yard will not be addressed further in this ROD.

2.1.4.14 Drum Site South of the Landfill

The Drum Site South of the Landfill is located 2,000 feet south of the active Fort Wainwright Landfill, between River Road and the Chena River (see Figure 1-2). This source area includes two drum areas: west drum area and east drum area. The source area was identified as a potential contaminant source in the RCRA Facility Assessment. However, no historical information about the drum storage or disposal activities at this source area is available. The area is an undeveloped woodland with no structures. Historically, the area has been used for military training exercises and Motorcross racing.

In August and September 1992, 573 unburied drums were removed. Approximately 20% of the drums contained gasoline, kerosene, and degreasing solvents. Analytical results from a 1992 PSE showed that levels of POL- and solvent-related compounds were below RBCs in soil. In 1993, ground-penetrating radar (GPR) confirmed that no additional drums were present.

The Army, ADEC, and EPA have recommended this source area for no further action because there is no evidence of a contaminant release that poses an unacceptable risk to human health or the environment, and GPR confirmed that no additional drums are present. A description of the no-further-action decision can be found in the Administrative Record. The Drum Site South of the Landfill will not be discussed further in this ROD.

2.1.4.15 Engineers Park Drum Site

The Engineers Park Drum Site is located on the northeast side of Engineers Park on the south bank of the Chena River (see Figure 1-2). Engineers Park has a picnic area with a football and baseball field and an area used for Bureau of Land Management smoke jumper training.

Drum disposal reportedly began at this source area after the 1967 Chena River flood. In August and September 1992, 680 unburied drums were removed from the source area. Approximately 10% of the drums contained gasoline, kerosene, degreasing solvents, and PCBs.

During the 1992 drum removal, low levels of SVOCs were detected in the surface soils. No additional drums were found during a 1993 PSE, and the maximum detected concentrations of contaminants of concern in subsurface soil and groundwater were below EPA's acceptable risk levels. GPR was used to confirm that no additional drums were present. The PSE concluded that there is no evidence that a contaminant release that poses an unacceptable risk to human health or the environment has occurred at this source area.

Based on the results of the PSE, the Army, ADEC, and EPA have recommended no further action for the Engineers Park Drum Site. A description of the no-further-action decision can be found in the Administrative Record. The Engineers Park Drum Site will not be discussed further in this ROD.

2.1.4.16 Building 3015

Building 3015 is located southwest of the Fort Wainwright runways, on Montgomery Road between Whidden and Meridian Roads (see Figure 1-2). Building 3015 is a two-story concrete block facility built in 1954. It was built as a heavy equipment maintenance, repair, and storage facility, and the second floor was built as an office area. A fenced motor park area is located west, north, and east of

the building.

Potential sources of contamination at this source area include a drum and battery storage area located along the west fence, a transformer storage area located along the north fence, and two 5,000-gallon underground storage tanks (USTs) associated with a heavy equipment and vehicle refueling point in the northwest corner of the motor park. In addition, multiple dry wells that were connected to the floor drain system before 1980 were a concern because of the chemicals used during routine maintenance and repair of heavy equipment and support vehicles, equipment and vehicle painting operations, pesticide storage and mixing operations, transformer storage, POL storage, and chemical storage within the building.

In 1989, the two leaking 5,000-gallon USTs, all related refueling equipment, and approximately 5,366 cubic yards of POL-contaminated soils were removed from the motor park. Soils were thermally remediated on Fort Wainwright, taken to the Fort Wainwright Landfill, and used for cover after analytical results indicated that the soils were remediated.

In 1993, a hazardous waste disposal contractor completed the removal and proper disposal of all drums and batteries from this source area. In addition, all stained soil was excavated, sampled, containerized, and removed from the area. Soil and groundwater analytical results from the subsequent PSE indicated that only petroleum compounds were present above ADEC regulatory levels but did not pose an unacceptable risk to human health or the environment.

Soil and groundwater sampling at the transformer storage area and within the building itself revealed no evidence of a release. Sampling and analysis around the dry wells indicated minor petroleum contamination, but levels did not pose an unacceptable risk to human health or the environment.

Because there is no evidence that the contaminant release at this source area poses an unacceptable risk to human health or the environment, the Army, ADEC, and EPA have recommended no further action for Building 3015. A description of the no-further-action decision can be found in the Administrative Record. Building 3015 will not be discussed further in this ROD.

2.1.4.17 Building 2250

Building 2250 is located approximately 1,200 feet southeast of Building 2092, the Golf Course Club House (see Figure 1-2). Building 2250 reportedly was used as a pesticide storage area during construction of the club house in the mid-1960s and contained a waste oil accumulation point. Herbicides also were stored in the building in the 1980s. The building was removed in 1991, and a fence was erected around the concrete pad. The concrete pad is used by the golf course as a maintenance equipment storage area.

PSE investigations were conducted from 1992 through 1994 to identify potential soil and groundwater contamination associated with the past use of pesticides and waste storage at the source area. No information confirming hazardous materials releases at this source area was found during the records search or interviews. PSE analytical results indicated that no pesticides or herbicides were present in soil or groundwater; however, petroleum products were detected in soil and groundwater.

Because there is no evidence that pesticides or herbicides were mismanaged or released to the soil at levels above RBCs, the Army, ADEC, and EPA have recommended no further action for Building

2250. A description of the no-further-action decision can be found in the Administrative Record. Petroleum-contaminated soil and groundwater are being investigated and remediated under the Two-Party Agreement. Building 2250 will not be discussed further in this ROD.

2.2 ENFORCEMENT ACTIVITIES

Fort Wainwright was placed on the CERCLA National Priorities List in August 1990. Consequently, a Federal Facility Agreement (FFA) was signed during spring 1992 by the Army, ADEC, and EPA. The FFA divided Fort Wainwright into five OUs, one of which is OU-1, and outlines the general requirements for investigation and/or remediation of suspected historical hazardous waste source areas and the associated procedures and schedules. The FFA ensures that appropriate actions are taken to protect public health and the environment in accordance with state and federal laws.

An additional goal of the FFA was to integrate the Army's CERCLA response obligations and Resource Conservation and Recovery Act (RCRA) corrective action obligations. This enabled the Army to obtain an RCRA Part B permit for its interim status facilities. This permit was issued during spring 1992. Remedial actions implemented under this ROD will be protective of human health and the environment and shall meet the substantive requirements of the NCP.

2.3 HIGHLIGHTS OF COMMUNITY PARTICIPATION

The public was encouraged to participate in the selection of the remedies for OU-1 during a public comment period from March 4 to April 3, 1997. The *Fort Wainwright Proposed Plan for Remedial Action, Operable Unit 1*, presents five combinations of options considered by the Army, ADEC, and EPA to address contamination in soil and groundwater at OU-1. The Proposed Plan was released to the public on March 1, 1997, and was sent to all known interested parties, which included approximately 150 elected officials and concerned citizens. A Fact Sheet dated January 1997, which provided additional information about the Army's entire cleanup program at Fort Wainwright, was distributed to the same mailing list.

The Proposed Plan summarizes cleanup alternatives for OU-1. Additional materials were placed in two information repositories: one at the Noel Wien Library in Fairbanks and the other at the Fort Wainwright Post Library. An Administrative Record, including all items placed in the information repositories and other documents used in the selection of the remedial actions, was established in Building 3023 on Fort Wainwright. The public was invited to inspect materials available in the Administrative Record and the information repositories during business hours.

Interested citizens were invited to comment on the Proposed Plan and the remedy selection process by mailing comments to the Fort Wainwright project manager; calling a toll-free telephone number to record a comment; or attending and commenting at a public meeting on March 11, 1997, in Fairbanks at the Carlson Center. No comments were received from the public during the comment period. Six people attended the public meeting.

Display advertisements in the *Fairbanks Daily News-Miner*, published on March 2, 5, 7, 9, and 11, 1997, also include information regarding the information repositories, the toll-free telephone line, and an address for submitting written comments.

The public did not provide any comments on the Proposed Plan. The Responsiveness Summary

provides a background discussion of community involvement activities conducted in association with OU-1. This document is Appendix B of this ROD.

This decision document presents the selected remedial action for OU-1 chosen in accordance with CERCLA as amended by the Superfund Amendments and Reauthorization Act of 1986 and, to the extent practicable, the NCP. The decision for OU-1 is based on the Administrative Record.

2.4 SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

As with many Superfund sites, the problems at Fort Wainwright are complex. OU-1 will be the fourth OU at Fort Wainwright, following OU-3, OU-4, and OU-2, to have completed the RI/FS process and to begin remedial action activities. The OU-1 RI and FS were performed in accordance with the RI/FS Management Plan for OU-1. The RI fieldwork was conducted from July through September 1995. The final RI, RA, and FS Reports were submitted to EPA and ADEC in September 1996 and February 1997, respectively. The *Final 801 Drum Burial Site, Supplemental 1996 Investigation Report* was completed in January 1997 and is part of the Administrative Record.

The remedial actions described in this ROD address threats to human health and the environment posed by the contamination at the OU-1 source areas.

3.0 SUMMARY OF SOURCE AREA CHARACTERISTICS

Physical features, hydrogeologic conditions, and the nature and extent of contamination for the 801 Drum Burial Site source area are described briefly in the following sections.

3.1 801 DRUM BURIAL SITE

3.1.1 Physical Features, Hydrogeologic Conditions, and Transport Pathways

The 801 Drum Burial Site is located approximately 0.13 mile east of the 801 Military Housing Area, immediately west of the Chena River, south of the Alaska Railroad bridge, and north of power lines (see Figure 1-1). Access to this source area was unrestricted before commencement of intrusive investigations. The source area was delineated by an orange construction fence and designated a contaminated area with signs since intrusive investigations began under the Remedial Investigation (RI).

A contractor-owned and operated military housing development (the 801 Military Housing Area) is close to the source area, across River Road. However, the road is elevated and provides a physical barrier that prevents typical surface water runoff from reaching the housing area. The road does direct surface water runoff to the Chena River, which is directly adjacent to the source area. Portions of the source area are heavily vegetated with small trees and thick brush, and other portions are covered with low grasses and unpaved roads.

Hydrogeologic conditions are difficult to characterize because of the source area's proximity to the Chena River. Groundwater occurs between 5 feet and 15 feet below ground surface (BGS) and fluctuates drastically with the rise and fall of the river. Groundwater flow direction also fluctuates drastically for the same reason.

The aquifer generally recharges the Chena River (i.e., groundwater flows into the river) when the river stage is low, which occurs during the low precipitation periods of late fall through late winter and mid-summer to early fall. The Chena River recharges the aquifer (i.e., groundwater flows from the river into the surrounding aquifer) during the high river stage, which occurs during the high precipitation periods and spring snowmelt, generally from early fall through mid-fall and from early spring through early summer.

Existing data suggest that the contaminant plumes in the groundwater are migrating from the known source areas; however, migration rates cannot be determined at this time. Existing data also suggest a high potential for the contaminants to migrate to the Chena River and affect downgradient groundwater users. Surface soil investigations suggest that contaminants have been transported to the river and other adjacent areas by overland flow of surface water (i.e., rain and snowmelt).

3.1.2 Nature and Extent of Contamination

Numerous investigations occurred at the 801 Drum Burial Site before the start of the RI. Historical soil and groundwater sample results are shown in Tables 3-1, 3-2, 3-3, 3-4, and 3-5, and in Figures 3-1 and 3-2.

During 1992, buried drums were discovered at the source area. In September 1992, 92 drums were

removed from the source area; 18 contained aqueous liquid, organic solids, flammable organic liquid, or chlorinated organic liquid. The other 74 drums were empty. During subsequent investigations, geophysical surveys were conducted to determine the location of additional buried drums. Soil borings were drilled, and monitoring wells were installed.

Surface soil analytical results indicated that diesel-range organics (DRO), toluene, xylenes, pesticides, and metals were present at the source area. Dieldrin was detected at a concentration exceeding risk-based concentrations (RBCs) in one surface soil sample. RBCs are conservative screening values used to determine whether a source area requires further action. Barium and chromium were found above background levels in several soil samples. DDT was detected above RBCs in one surface soil sample.

Gasoline-range organics (GRO), DRO, several volatile organic compounds (VOCs), naphthalene, di-n-butylphthalate, chlorinated pesticides, and metals were detected in subsurface soil samples at the 801 Drum Burial Site. GRO and DRO were found at concentrations above potential applicable or relevant and appropriate requirements (ARARs). Aldrin; dieldrin; dichlorodiphenyldichloroethane (DDD); and 1,2,3-trichloropropane were detected at concentrations exceeding RBCs. Barium and chromium were detected at concentrations exceeding background values.

GRO, DRO, naphthalene, chlorinated pesticides, and metals were detected in groundwater samples at the 801 Drum Burial Site. Benzene; cis-1,2-dichloroethene; trichloroethene; aldrin; and dieldrin were detected at concentrations exceeding either potential ARARs or RBCs. Arsenic and lead concentrations exceed State of Alaska Drinking Water Standards (18 Alaska Administrative Code 80), the federal Safe Drinking Water Act maximum contaminant levels (MCLs), and background levels. Iron and manganese concentrations exceed secondary MCLs.

In 1995, the RI for Operable Unit 1 (OU-1) was conducted. The principal objectives were to define the boundary of drum burial areas, the extent of surface soil contamination, and the vertical and horizontal extent of subsurface soil and groundwater contamination. The OU-1 RI field investigation consisted of the following tasks: geophysical survey, surface and subsurface soil investigations, groundwater monitoring well installation and sampling, surface water and sediment sampling, and monthly water level measurements. A summary of the RI surface soil, excavation, subsurface soil, groundwater, and sediment sample results is in Tables 3-6 through 3-11 and in Figures 3-3 and 3-4.

Three surface soil samples were collected in presumed undisturbed areas to provide background data; however, the analytical results from the collected samples indicate that the sampled areas probably were disturbed. DRO, methylene chloride, pesticides, and metals were detected in these samples. DDT was detected at concentrations exceeding the RBC in all three samples. Chromium was detected at concentrations exceeding background concentrations.

Three areas were identified as having anomalies in previous geophysical surveys. No drums were found in excavations in these areas. However, a fourth area was investigated because drums were suspected to have been buried in this area. Thirty-four drums were removed before the Army had to halt operations because the work exceeded the scope of the contract. Twenty-six drums were empty. The eight remaining drums were partially full; these were overpacked and will be sampled before disposal. Analytical results from this excavation indicated the presence of GRO, DRO, VOCs, aldrin, dieldrin, and DDD. Dieldrin was detected at concentrations exceeding its RBC in six of the seven samples collected.

Two soil borings were drilled during the 1995 RI fieldwork. GRO, DRO, several VOCs, pesticides, and metals were detected in subsurface soil samples. DRO, DDT, and dichlorodiphenyldichloroethene concentrations exceeded either ARARs or RBCs at the 5-foot- and 10-foot-BGS intervals in boring AP-7162 (see Figure 3-3). No analytes were detected above ARARs or RBCs in the other boring drilled (AP-7163).

GRO, DRO, several VOCs, and pesticides were detected in groundwater samples collected from the 10 on-site monitoring wells (see Figure 3-4). Dieldrin was detected at concentrations exceeding its RBC in five of the 12 samples (including two duplicate samples). Benzene; 1,1-dichloroethylene (DCE); cis-1,2-DCE; and vinyl chloride were detected at concentrations exceeding their respective RBCs in well AP-6326. In well AP-6327, the detected benzene concentration exceeded its MCL (5 micrograms per liter) and the vinyl chloride concentration exceeded its RBC.

Arsenic and barium were detected in surface water samples collected from the Chena River; however, the detected concentrations did not exceed Federal Ambient Water Quality Criteria (see Table 3-11). VOCs, DDD, DDT, and metals were detected in sediment samples collected from the Chena River. DDD, DDT, arsenic, and barium levels exceed sediment quality benchmarks published by Hall and Suter. However, the highest hits of DDD and DDT are located upgradient of the source area.

Because the excavation indicated the presence of possibly more drums, another geophysical survey was conducted to evaluate other potential locations of buried drums. Magnetic and electromagnetic surveys were conducted in 1996, and up to eight areas with anomalies were encountered. In 1996, 118 drums were excavated from the areas identified in the geophysical survey. Results of the 1996 excavation are summarized in the *801 Drum Burial Site Supplemental 1996 Investigation Report*. During the investigation, 10 monitoring wells and 11 Microwells were sampled (see Appendix A). Analytical results indicate that the 10 monitoring wells exceeded the MCLs for VOCs, one pesticide (dieldrin), and total metals. Groundwater from the 11 Microwells exceeded the MCLs for benzene, bis(2-ethylhexyl)phthalate, aldrin, dieldrin, and several metals (see Appendix A). Analysis of soil in excavated drums indicated DRO, DDD, DDT, aldrin, dieldrin, lindane, and heptaclor epoxide. Drum water contained benzene; 1,4-dichlorobenzene; 1,2-dichloroethane; cis-1,2-dichloroethene; vinyl chloride; dieldrin; and heptaclor. Sludge in excavated drums contained DRO; GRO; benzene, toluene, ethylbenzene, and total xylenes; DDD; DDT; aldrin; dieldrin; heptaclor; 1,2,4-trimethylbenzene; and lindane.

Table 3-1

SUMMARY OF PREVIOUS MAXIMUM SURFACE AND SUBSURFACE SOIL SAMPLE RESULTS (PRE-1994)
801 DRUM BURIAL SITE
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA
(mg/kg)

Analyte	Number of Samples Analyzed/Detected	Range of Detected Concentrations	Location of Maximum Concentration	Risk-based Screening Concentration or ARAR[a]	Number of Samples Exceeding RBCs
Petroleum Hydrocarbons					
Diesel-range organics	26/10	15-860	AP-6329	200[b]	3
Gasoline-range organics	26/7	5-300	AP-6327	100[c]	6
Volatile Organic Compounds					
Toluene	26/1	0.006	AP-6326	1,600[a], 15[d]	0
Xylenes	26/2	0.017-0.45	AP-6329	16,000[a], 15[d]	0
1,2,4-TMB	26/1	0.4	AP-6329	39[a]	0
1,3,5-TMB	26/1	0.23	AP-6329	390[a]	0
1,2,3-Trichloropropane	26/1	0.043	AP-6331	0.0091[a]	0
Acetone	26/6	0.052-0.36	AP-6329	780[a]	0
cis-1,2-DCE	26/1	0.035	AP-6326	78[a]	0
Chloroform	26/1	0.019	AP-6326	10[a]	0
2-Butanone	26/1	0.032	AP-6330	4,700[a]	0
trans-1,2-Dichloroethene	26/1	0.005	—	160[a]	0
Semivolatile Organic Compounds					
Naphthalene	26/1	0.12	AP-6329	310[b]	0

Key at end of table.

Table 3-1

SUMMARY OF PREVIOUS MAXIMUM SURFACE AND SUBSURFACE SOIL SAMPLE RESULTS (PRE-1994)
801 DRUM BURIAL SITE
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA
(mg/kg)

Analyte	Number of Samples Analyzed/Detected	Range of Detected Concentrations	Location of Maximum Concentration	Risk-based Screening Concentration or ARAR[a]	Number of Samples Exceeding RBCs
Pesticides					
Aldrin	26/5	0.06-1.9	AP-6329	0.0038[a]	5
Dieldrin	26/12	0.01-2.2	AP-6330	0.004[a]	5
4,4'-DDD	26/6	0.02-0.61	AP-6329	0.27[a], 0.17[d]	1
4,4'-DDE	26/4	0.02-0.13	Background	0.19[a], 0.101[d]	0
4,4'-DDT	26/11	0.01-0.25	Background	0.19[a], 0.27[d]	1
Endrin	26/1	0.02	AP-6330	2.3[a]	0
Metals					
Aluminum	26/26	3,750-11,800	NR	NA	NA
Arsenic	26/26	1-11	Background	2.3[a], 14[e]	7
Barium	26/7	59-116	AP-6328	550[a], 115[e]	0
Calcium	26/26	1,680-8,900	NR	NA	NA
Cobalt	26/26	4-12	NR	NA	NA
Chromium	26/7	14-24	AP-6326	39[a], 19[e]	0
Copper	26/26	8-31	NR	10,000[a]	0
Iron	26/26	7,370-22,500	NR	NA	NA

Key at end of table.

Table 3-1

SUMMARY OF PREVIOUS MAXIMUM SURFACE AND SUBSURFACE SOIL SAMPLE RESULTS (PRE-1994)
801 DRUM BURIAL SITE
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA
(mg/kg)

Analyte	Number of Samples Analyzed/Detected	Range of Detected Concentrations	Location of Maximum Concentration	Risk-based Screening Concentration or ARAR[a]	Number of Samples Exceeding RBCs
Lead	26/7	4-8	AP-6326	26[e], 400[f]	0
Magnesium	26/26	2,460-7,000	NR	NA	NA
Manganese	26/26	92-397	NR	30,000[a]	0
Nickel	26/26	10-25	NR	NA	NA
Potassium	26/26	500-1,520	NR	NA	NA
Sodium	26/26	114-432	NR	NA	NA
Vanadium	26/26	15-44	NR	2,000[a]	0
Zinc	26/26	18-58	NR	80,000[a]	0

a Risk-based screening concentration values are based on 1×10^{-7} residential direct contact risk (EPA, Region 3, RBC Tables, October 20, 1995).
b ADEC soil cleanup matrix score Level B for DRO is 200 mg/kg.
c ADEC soil cleanup matrix score Level B for GRO is 100 mg/kg.
d Recommended background level for pesticides.
e Recommended background level for metals.
f EPA-recommended screening level for lead.

Key at end of table.

Table 3-1 (Cont.)

Key:

ADEC = Alaska Department of Environmental Conservation.
ARARs = Applicable or relevant and appropriate requirements.
DCE = Dichloroethene.
DDD = Dichlorodiphenyldichloroethane.
DDE = Dichlorodiphenyltrichloroethene.
DDT = Dichlorodiphenyltrichloroethane.
DRO = Diesel-range organics.
EPA = United States Environmental Protection Agency.
GRO = Gasoline-range organics.
mg/kg = Milligrams per kilogram.
NA = Not applicable.
NR = Not reported.
RBCs = Risk-based concentrations.
TMB = Trimethylbenzene.

Table 3-2

HISTORICAL GROUNDWATER CONTAMINATION (PRE-1994)
801 DRUM BURIAL SITE
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA
(µg/L)

Analyte	Number of Samples Analyzed/Detected[a]	Range of Detected Concentrations	Location of Maximum Concentration	MCL or Risk-Based Screening Concentration[a]	Number of Samples Exceeding RBCs
Petroleum Hydrocarbons					
Diesel-range organics	7/7	87-5,570	AP-6327	15[b]	7
Gasoline-range organics	7/4	198-1,800	AP-6327	15[b]	4
Volatile Organic Compounds					
Benzene	7/4	3.4-140	AP-6327	5[c], 0.36[d]	3
Ethylbenzene	7/3	7-74	AP-6327	700[c], 130[d]	0
Xylenes	7/3	17-450	AP-6329	10,000[c], 1,200[d]	0
1,2,4-TMB	7/3	84-130	AP-6327	30[d]	3
1,3,5-TMB	7/3	30-58	AP-6327	30[d]	1
n-Propylbenzene	7/1	21	AP-6327	NA	NA
1,1-Dichloroethene	7/1	5.7	AP-6326	7[c], 0.044[d]	1
cis-1,2-Dichloroethene	7/3	12-390	AP-6326	70[c], 6.1[d]	2
trans-1,2-Dichloroethene	7/1	50	AP-6326	100[c], 12[d]	1
Trichloroethene	7/1	7.3	AP-6326	5[c], 1.6[d]	1
Vinyl chloride	7/1	0.9	AP-6326	2[c], 0.019[d]	1
Carbon disulfide	7/1	25	AP-6329	100	0

Key at end of table.

Table 3-2

HISTORICAL GROUNDWATER CONTAMINATION (PRE-1994)
801 DRUM BURIAL SITE
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA
(µg/L)

Analyte	Number of Samples Analyzed/Detected[a]	Range of Detected Concentrations	Location of Maximum Concentration	MCL or Risk-Based Screening Concentration[a]	Number of Samples Exceeding RBCs
Pesticides					
Dieldrin	7/7	0.04-1.5	AP-6331	0.0042[d]	6
Aldrin	7/1	0.17	AP-6329	0.004[d]	1
Endrin	7/1	0.06	AP-6331	2[c], 1.1[d]	0
Semivolatile Organic Compounds					
Naphthalene	7/2	28	AP-6327	1,500[d]	0
Metals					
Aluminum	7/7	172-5,190	AP-6330	NA	NA
Arsenic	7/4	8-82	AP-6329	50[e], 11[d]	1
Barium	7/7	149-511	AP-6327	2,000[e], 2,600[d]	0
Calcium	7/7	39,100-137,000	AP-6327	NA	NA
Chromium	7/3	5-17	AP-6630	100[e], 180[d]	0
Cobalt	7/3	10-16	AP-6327	2,200[d]	0
Copper	7/4	12-23	AP-6330	1,000	0
Lead	7/4	4-8	AP-6630	15[f]	0
Iron	7/7	1,280-86,000	AP-6327	300[g], 11,000[d]	NA

Key at end of table.

Table 3-2

HISTORICAL GROUNDWATER CONTAMINATION (PRE-1994)
801 DRUM BURIAL SITE
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA
(µg/L)

Analyte	Number of Samples Analyzed/Detected[a]	Range of Detected Concentrations	Location of Maximum Concentration	MCL or Risk-Based Screening Concentration[a]	Number of Samples Exceeding RBCs
Manganese	7/7	358-5,910	AP-6327	1,000	7
Magnesium	7/7	9,150-40,600	AP-6327	NA	NA
Potassium	7/7	4,480-9,800	AP-6327	NA	NA
Sodium	7/7	2,330-8,480	AP-6327	NA	NA
Vanadium	7/2	8-11	AP-6330	260[d]	0
Zinc	7/4	22-38	AP-6330	10,000[d]	0

a Duplicate samples are included.
b State of Alaska Water Quality Standards (18 AAC 70).
c Primary MCL, 18 AAC 80.
d EPA, Region 3, RBC Tables, October 20, 1995.
e The MCL is provided where available. If none exists, then the RBC is provided based on a 1×10^{-6} risk for tap water.
f 18 AAC 80.815, lead action level.
g Secondary MCL, 18 AAC 80.

Key:

AAC = Alaska Administrative Code.
EPA = United States Environmental Protection Agency.
MCL = Maximum contaminant level.
µg/L = Micrograms per liter.
NA = Not applicable.
RBCs = Risk-based concentrations.
TMB = Trimethylbenzene.

Table 3-3

DETECTED ANALYTES IN SURFACE SOIL
1994 DATA
801 DRUM BURIAL SITE
FORT WAINWRIGHT, ALASKA
(mg/kg)

Analyte	Number of Samples Analyzed/ Number of Detections	Range of Detected Concentrations	Risk-Based Screening Concentration	Number of Samples Exceeding RBCs
Petroleum Hydrocarbons				
DRO	3/3	4.3-5.3	200[a]	0
Volatile Organic Compounds				
Acetone	3/1	0.019	780[b]	0
Pesticides				
DDT	3/1	0.0064	0.19[c], 0.27[d]	0
Metals				
Arsenic	3/3	7.3-12	2.3[e], 14[c]	3
Barium	3/3	70-121	550[e], 115[c]	0
Chromium	3/3	12-20	39[e], 19[c]	0
Lead	3/3	5.6-7.8	26[c], 400[f]	0

a Level B cleanup level for DRO is 200 mg/kg.
b RBCs are based on 1×10^{-7} direct contact risk (EPA, Region 3, RBC Table, October 20, 1995).
c United States Army Corps of Engineers-recommended background level for metals.
d United States Army Corps of Engineers-recommended background level for pesticides.
e Risk-based screening concentration values are based on 1×10^{-7} residential direct contact risk (EPA, Region 3, RBC Tables, October 20, 1995).
f EPA-recommended screening level for lead.

Key:

DDT = Dichlorodiphenyldichloroethene.
DRO = Diesel-range organics.
EPA = United States Environmental Protection Agency.
mg/kg = Milligrams per kilogram.
RBCs = Risk-based concentrations.

Table 3-4

DETECTED ANALYTES IN SUBSURFACE SOIL
1994 DATA
801 DRUM BURIAL SITE
FORT WAINWRIGHT, ALASKA
(mg/kg)

Analyte	Number of Samples Analyzed/ Number of Detections	Range of Detected Concentrations	Risk-Based Screening Concentration	Number of Samples Exceeding RBCs
Petroleum Hydrocarbons				
DRO	14/10	4.4-12	200[a]	0
Volatile Organic Compounds				
Acetone	14/1	0.028	780[b]	0
Semivolatile Organic Compounds				
di-n-Butylphthalate	14/4	0.458-0.534	780[b]	0
Metals				
Arsenic	14/14	1.9-12	2.3[b], 14[c]	0
Barium	14/14	42-94	550[b], 115[c]	0
Chromium	14/14	7.1-15	39[b], 19[c]	0
Lead	14/14	2.6-6	26[c], 400[d]	0

a Level B cleanup level for DRO is 200 mg/kg.
b RBCs are based on 1×10^{-7} residential direct contact risk (EPA, Region 3, RBC Tables, October 20, 1995).
c United States Army Corps of Engineers-recommended background level.
d EPA-recommended screening level for lead.

Key:

DRO = Diesel-range organics.
EPA = United States Environmental Protection Agency.
mg/kg = Milligrams per kilogram.
RBCs = Risk-based concentrations.

Table 3-5

DETECTED ANALYTES IN GROUNDWATER
1994 DATA
801 DRUM BURIAL SITE
FORT WAINWRIGHT, ALASKA
(µg/L)

Analyte	Number of Samples Analyzed/Detected	Range of Detected Concentrations	MCL or Risk-Based Screening Concentration[a]	Number of Samples Exceeding RBCs
Petroleum Hydrocarbons				
DRO	7/7	120-75,000	15[b]	7
Volatile Organic Compounds				
Benzene	2/7	14-39	0.36[c]	2
Ethylbenzene	1/7	51	130[c]	0
Toluene	2/7	2.0-5.1	75[c]	0
Total xylenes	2/7	43-74	1,200[c]	0
1,2,4-Trimethylbenzene	2/7	23-120	30[c]	1
1,3,5-Trimethylbenzene	2/7	12-40	30[c]	1
cis-1,2-Dichloroethene	1/7	2.2	6.1[c]	0
Isopropylbenzene	2/7	5.8-14	UA	NA
n-Propyl benzene	2/7	5.7-18	UA	NA
sec-Butyl benzene	217	1.6-5.2	6.1[c]	0
Naphthalene	2/7	6.7-32	150[c]	0
p-Isopropyl toluene	2/7	4.1-6.4	UA	NA
Semivolatile Organic Compounds				
Naphthalene	1/7	15	150[c]	0
Pesticides/Polychlorinated Biphenyls				
Aldrin	2/7	0.039-0.24	0.004	2
Dieldrin	2/7	0.064-0.27	0.0042	2
Metals				
Arsenic	7/7	10-81	72[d]	2
Barium	7/7	190-720	988[d]	0
Chromium	4/7	30-100	125[d]	0
Lead	7/7	14-77	66[d]	1

Key at end of table.

Table 3-5 (Cont.)

a MCL is provided where available. Also included is the RBC.
b State of Alaska Water Quality Standards (18 AAC 70).
c RBCs are based on 1×10^{-7} for tap water risk (EPA, Region 3, RBC Table, October 20, 1995).
d United States Army Corps of Engineers-recommended background level.

Key:

AAC = Alaska Administrative Code.
DRO = Diesel-range organics.
EPA = United States Environmental Protection Agency.
MCL = Maximum contaminant level.
µg/L = Milligrams per liter.
NA = Not applicable.
RBCs = Risk-based concentrations.
UA = Unavailable.

Table 3-6

SUMMARY OF ANALYTES DETECTED IN SURFACE SOIL SAMPLES DURING THE REMEDIAL INVESTIGATION 801 DRUM BURIAL SITE OPERABLE UNIT 1 FORT WAINWRIGHT, ALASKA (mg/kg)

Analyte	Number of Samples Analyzed/Detected[a]	Range of Detected Concentrations	Location of Maximum Concentration	Risk-Based Screening Concentration or ARAR[b]	Number of Samples Exceeding RBCs
Petroleum Hydrocarbons					
Diesel-range organics	4/4	35-133	Surface 2	200[c]	0
Total organic carbon	4/4	1.55-2.86	Surface 2	NA	NA
Volatile Organic Compounds					
Methylene chloride	4/2	0.018-0.029	Surface 2	8.5[b]	0
Pesticides					
4,4'-DDD	4/4	0.003-0.005	Surface 2	0.27[b], 0.17[d]	0
4,4'-DDE	4/4	0.06-0.1	Surface 2	0.19[b], 0.101[d]	0
4,4'-DDT	4/4	0.2-0.38	Suface 2	0.19[b], 0.27[d]	4
Dieldrin	4/1	0.002	Surface 1	0.004[b]	0
Metals					
Arsenic	4/4	8-10	Surface 1	2.3[b], 14[e]	4
Barium	4/4	90-107	Surface 1	550[b], 115[d]	0
Chromium	4/4	16-20	Surface 1 and 2	39[b], 19[e]	0
Lead	4/4	10-17	Surface 3	26[e], 400[f]	0
Silver	4/4	0.6-0.9	Surface 1	39[b]	0

Key at end of table.

Table 3-6 (Cont.)

a Duplicate samples are included.
b Risk-based screening concentration values are based on a 1×10^{-7} residential direct contact risk (EPA, Region 3, RBC Table, October 20, 1995).
c ADEC soil cleanup matrix score Level B for DRO is 200 mg/kg.
d Recommended background level for pesticides.
e United States Army Corps of Engineers-recommended background level for metals.
f EPA-recommended screening level for lead in soil.

Key:

ADEC = Alaska Department of Environmental Conservation.
ARAR = Applicable or relevant and appropriate requirement.
DDD = Dichlorodiphenyldichloroethane.
DDE = Dichlorodiphenyldichloroethene.
DDT = Dichlorodiphenyltrichloroethane.
DRO = Diesel-range organics.
EPA = United States Environmental Protection Agency.
mg/kg = Milligrams per kilogram.
NA = Not applicable.
RBCs = Risk-based concentrations.

Table 3-7

SUMMARY OF ANALYTES DETECTED IN EXCAVATION SUBSURFACE SOIL SAMPLES COLLECTED DURING THE REMEDIAL INVESTIGATION 801 DRUM BURIAL SITE OPERABLE UNIT 1 FORT WAINWRIGHT, ALASKA (mg/kg)

Analyte	Number of Samples Analyzed/Detected	Range of Detected Concentrations	Location of Maximum Concentration	Risk-Based Screening Concentration[a]	Number of Samples Exceeding RBCs
Petroleum Hydrocarbons					
Diesel-range organics	10/6	13-562	Excavation 4-2	200[b]	4
Gasoline-range organics	10/4	8-120	Excavation 4-1	100[c]	1
Volatile Organic Compounds					
1,2,3-Trichlorobenzene	10/1	0.003	Excavation 3	NA	NA
1,2,4-Trichlorobenzene	10/1	0.002	Excavation 3	78[a]	0
1,2,4-Trimethylbenzene	10/2	0.008-0.042	Excavation 4-2	39[a]	0
1,2-Dichlorobenzene	10/1	0.001	Excavation 3	700[a]	0
1,3,5-Trimethylbenzene	10/3	0.012-0.037	Excavation 4-4	390[a]	0
1,3-Dichlorobenzene	10/1	0.001	Excavation 3	700[a]	0
1,4-Dichlorobenzene	10/1	0.001	Excavation 3	2.7[a]	0
2-Butanone	10/2	0.006-0.98	Excavation 4-2	NA	NA
Acetone	10/5	0.039-2.3	Excavation 4-2	780[a]	0
Hexachlorobutadiene	10/1	0.002	Excavation 3	0.82[a]	0
Methylene chloride	10/8	0.005-0.032	Excavation 4-2	8.5[a]	0
n-Butylbenzene	10/1	0.0008	Excavation 3	NA	NA

Key at end of table.

Table 3-7

SUMMARY OF ANALYTES DETECTED IN EXCAVATION SUBSURFACE SOIL SAMPLES COLLECTED DURING THE REMEDIAL INVESTIGATION 801 DRUM BURIAL SITE OPERABLE UNIT 1 FORT WAINWRIGHT, ALASKA (mg/kg)

Analyte	Number of Samples Analyzed/Detected	Range of Detected Concentrations	Location of Maximum Concentration	Risk-Based Screening Concentration[a]	Number of Samples Exceeding RBCs
Naphthalene	10/3	0.002-0.008	Excavation 4-2	310[a]	0
p-Isopropyltoluene	10/3	0.0009-0.009	Excavation 4-2	NA	NA
sec-Butylbenzene	10/1	0.0007	Excavation 3	78[a]	0
Toluene	10/1	0.013	Excavation 4-2	600[a], 15[d]	0
Total xylenes	10/2	0.011-0.038	Excavation 4-2	16,000[a], 15[d]	0
Pesticides					
4,4'-DDD	10/6	0.003-1.0	Excavation 4-1	0.27[a], 0.17[e]	1
4,4'-DDE	10/7	0.003-0.01	Excavation 4-3	0.19[a], 0.101[e]	0
4,4'-DDT	10/10	0.002-0.17	Excavation 4-3	0.19[a], 0.27[e]	0
Aldrin	10/6	0.001-1.1	Excavation 4-4	0.0038[a]	5
Dieldrin	10/7	0.02-1.2	Excavation 4-6	0.004[a]	7
Endrin	10/5	0.003-0.02	Excavation 4-6	2.3[a]	0
Metals					
Arsenic	10/10	3-6	Excavation 1	2.3[a], 14[f]	10
Barium	10/10	50-92	Excavation 4-3	550[a], 115[f]	0
Chromium	10/10	9-15	Excavation 4-1 and 4-3	39[a], 19[f]	0

Key at end of table.

Table 3-8

SUMMARY OF ANALYTES DETECTED IN SUBSURFACE SOIL SAMPLES COLLECTED DURING THE REMEDIAL INVESTIGATION 801 DRUM BURIAL SITE OPERABLE UNIT 1 FORT WAINWRIGHT, ALASKA (mg/kg)

Analyte	Number of Samples Analyzed/Detected	Range of Detected Concentrations	Location of Maximum Concentration	Risk-Based Screening Concentration[a]	Number of Samples Exceeding RBCs
Petroleum Hydrocarbons					
Diesel-range organics	11/9	4-1,030	AP-7162	200[b]	2
Gasoline-range organics	11/1	6	AP-7162	100[c]	0
Volatile Organic Compounds					
1,2,3-Trichlorobenzene	11/6	0.0006-0.001	AP-7163	NA	NA
1,2,4-Trichlorobenzene	11/2	0.0007-0.0008	AP-7163	78[a]	0
Acetone	11/8	0.034-0.18	AP-7162	780[a]	0
Hexachlorobutadiene	11/2	0.0006-0.0007	AP-7163	0.82[a]	0
Methylene chloride	11/9	0.004-0.018	AP-7162	8.5[a]	0
Naphthalene	11/4	0.0007-0.001	AP-7163	310[a]	0
Pesticides					
4,4'-DDD	11/4	0.005-0.14	AP-7162	0.27[a], 0.17[d]	0
4,4'-DDE	11/6	0.008-0.37	AP-7162	0.19[a], 0.101[d]	3
4,4'-DDT	11/6	0.06-6.1	AP-7162	0.19[a], 0.27[d]	5
Endrin	11/1	0.002	AP-7162	2.3[a]	0

Key at end of table.

Table 3-7

SUMMARY OF ANALYTES DETECTED IN EXCAVATION SUBSURFACE SOIL SAMPLES COLLECTED DURING THE REMEDIAL INVESTIGATION 801 DRUM BURIAL SITE OPERABLE UNIT 1 FORT WAINWRIGHT, ALASKA (mg/kg)

Analyte	Number of Samples Analyzed/Detected	Range of Detected Concentrations	Location of Maximum Concentration	Risk-Based Screening Concentration[a]	Number of Samples Exceeding RBCs
Lead	10/10	3-10	Excavation 4-1	26[f], 400[g]	0
Nickel	3/3	12-20	Excavation 1	160[a]	0
Silver	10/6	0.4-0.9	Excavation 4-3	39[a]	0

a Risk-based screening concentration values are based on a 1×10^{-7} residential direct contact risk (EPA, Region 3, RBC Table, October 20, 1995).
b ADEC soil cleanup matrix score Level B for DRO is 200 mg/kg.
c ADEC soil cleanup matrix score Level B for GRO is 100 mg/kg.
d ADEC soil cleanup matrix score Level B for BTEX is 15 mg/kg.
e USACE-recommended background level for pesticides.
f USACE-recommended background level for metals.
g EPA-recommended screening level for lead in soils.

Key:

ADEC = Alaska Department of Environmental Conservation.
BTEX = Benzene, toluene, ethylbenzene, and total xylenes.
DDD = Dichlorodiphenyldichloroethane.
DDE = Dichlorodiphenyldichloroethene.
DDT = Dichlorodiphenyltrichloroethane.
DRO = Diesel-range organics.
EPA = United States Environmental Protection Agency.
GRO = Gasoline-range organics.
mg/kg = Milligrams per kilogram.
NA = Not applicable.
RBCs = Risk-based concentrations.
USACE = United States Army Corps of Engineers.

Table 3-8

SUMMARY OF ANALYTES DETECTED IN SUBSURFACE SOIL SAMPLES COLLECTED DURING THE REMEDIAL INVESTIGATION 801 DRUM BURIAL SITE OPERABLE UNIT 1 FORT WAINWRIGHT, ALASKA (mg/kg)

Analyte	Number of Samples Analyzed/Detected	Range of Detected Concentrations	Location of Maximum Concentration	Risk-Based Screening Concentration[a]	Number of Samples Exceeding RBCs
Methoxychlor	11/1	0.005	AP-7163	3.9[a]	0
Metals					
Arsenic	11/11	2-10	AP-7163	2.3[a], 14[e]	10
Barium	11/11	45-119	AP-7163	550[a], 115[e]	0
Chromium	11/11	8-20	AP-7163	39[a], 19[e]	0
Lead	11/11	3-12	AP-7162	26[e], 400[f]	0
Mercury	11/1	0.05	AP-7163	2.3[a]	0
Nickel	11/11	11-26	AP-7163	160[a]	0

a Risk-based screening concentration values are based on 1×10^{-7} residential direct contact risk (EPA, Region 3, RBC Table, October 20, 1995).
b ADEC soil cleanup matrix score Level B for DRO is 200 mg/kg.
c ADEC soil cleanup matrix score Level B for GRO is 100 mg/kg.
d USACE-recommended background levels for pesticides.
e USACE-recommended background levels for metals.
f EPA-recommended screening level for lead in soils.

Key at end of table.

Table 3-8 (Cont.)

Key:

ADEC = Alaska Department of Environmental Conservation.
DDD = Dichlorodiphenyldichloroethane.
DDE = Dichlorodiphenyldichloroethene.
DDT = Dichlorodiphenyltrichloroethane.
DRO = Diesel-range organics.
EPA = United States Environmental Protection Agency.
GRO = Gasoline-range organics.
mg/kg = Milligrams per kilogram.
NA = Not applicable.
RBCs = Risk-based concentrations.
USACE = United States Army Corps of Engineers.

Table 3-9

SUMMARY OF ANALYTES DETECTED IN GROUNDWATER DURING THE REMEDIAL INVESTIGATION
801 DRUM BURIAL SITE
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA
(µg/L)

Analyte	Number of Samples Analyzed/Detected[a]	Range of Detected Concentrations	Location of Maximum Concentration	MCL or Risk-Based Screening Concentration[b]	Number of Samples Exceeding RBCs
Petroleum Hydrocarbons					
Diesel-range organics	12/12	34-2,480	AP-6327	15[c]	12
Gasoline-range organics	12/4	41-1,210	AP-6327	15[c]	4
Volatile Organic Compounds					
Benzene	12/2	1.7-42	AP-6327	0.36[b], 5[d]	2
Ethylbenzene	12/1	41	AP-6327	130[b], 700[d]	0
Toluene	12/8	0.1-1.1	AP-6327	75[b], 1,000[d]	0
Total xylenes	12/1	64	AP-6327	1,200[b], 10,000[d]	0
1,1,2-Trichloroethane	12/2	0.1-0.2	AP-7162	0.19[b], 5[d]	1
1,1-Dichloroethene	12/1	1.7	AP-6326	0.044[b], 7[d]	1
1,2,4-TMB	12/1	89	AP-6327	30[d]	1
1,2-Dichloroethane	12/1	0.2	AP-6326	5[c], 0.12[d]	0.2
1,3,5-TMB	12/1	28	AP-6327	30[d]	0
1,3-Dichloropropane	12/2	0.1-0.2	AP-7162	NA	NA
2-Butanone	12/6	1-3	AP-6331	NA	NA
4-Methyl-2-pentanone	12/2	30-40	AP-6331	NA	NA

Key at end of table.

Table 3-9

SUMMARY OF ANALYTES DETECTED IN GROUNDWATER DURING THE REMEDIAL INVESTIGATION
801 DRUM BURIAL SITE
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA
(µg/L)

Analyte	Number of Samples Analyzed/Detected[a]	Range of Detected Concentrations	Location of Maximum Concentration	MCL or Risk-Based Screening Concentration[b]	Number of Samples Exceeding RBCs
Acetone	12/12	2-14	AP-6331	370[d]	0
cis-1,2-Dichloroethene	12/4	1.3-230	AP-6326	70[b], 6.1[d]	1
Dibromomethane	12/1	0.2	AP-7162	NA	NA
Isopropylbenzene	12/1	14	AP-6327	NA	NA
Methylene chloride	12/4	0.1-1.0	AP-6327	5[c], 4.1[d]	0
n-Butylbenzene	12/1	2	AP-6327	NA	NA
n-Propylbenzene	12/1	14	AP-6327	NA	NA
Naphthalene	12/3	0.2-60	AP-6327	150[d]	0
p-Isopropyltoluene	12/1	5	AP-6327	NA	NA
sec-Butylbenzene	12/1	4	AP-6327	6.1[d]	0
trans-1,2-Dichloroethene	12/3	0.2-24	AP-6326	100[c], 12[d]	1
Trichloroethene	12/1	3.1	AP-6326	5[c], 1.6[d]	1
Vinyl chloride	12/2	0.2-0.7	AP-6326	2[c], 0.019[d]	2

Key at end of table.

Table 3-9

SUMMARY OF ANALYTES DETECTED IN GROUNDWATER DURING THE REMEDIAL INVESTIGATION
801 DRUM BURIAL SITE
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA
(µg/L)

Analyte	Number of Samples Analyzed/Detected[a]	Range of Detected Concentrations	Location of Maximum Concentration	MCL or Risk-Based Screening Concentration[b]	Number of Samples Exceeding RBCs
Pesticides					
Dieldrin	12/8	0.007-1.9	AP-6331	0.0042[d]	8
Endrin	12/4	0.004-0.04	AP-6331	2[c], 1.1[d]	0
4,4'-DDT	12/3	0.008-0.03	AP-7162	0.2[d]	0
gamma-BHC (lindane)	12/1	0.005	AP-6327	0.2[c], 0.052[d]	0

a Duplicate samples are included.
b MCLs are provided when available. The RBC for a risk of 1×10^{-6} for tap water also is provided or an HQ = 0.1 when available.
c Primary MCL, 18 AAC 80.
d EPA, Region 3, RBC Table, October 20, 1995. The RBC for a risk of 1×10^{-6} for tap water also is provided or an HQ = 0.1 when available.

Key:

AAC = Alaska Administrative Code.
BHC = Benzene hexachloride.
DDT = Dichlorodiphenyltrichloroethane.
EPA = United States Environmental Protection Agency.
HQ = Hazard quotient.
MCL = Maximum contaminant level.
µg/L = Micrograms per liter.
NA = Not applicable.
RBCs = Risk-based concentrations.
TMB = Trimethylbenzene.

Table 3-10

ANALYTES DETECTED IN SURFACE SEDIMENT DURING THE REMEDIAL INVESTIGATION
801 DRUM BURIAL SITE
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA
(mg/kg)

Analytes	Number of Samples/ Number of Detections	Range of Detected Concentrations	Location of Maximum Contaminant Level	Risk-Based Screening or ARAR	Number of Samples Exceeding RBC
Acetone	6/1	0.08	OU-1 EC01	0.064[a]	1
Arsenic	6/6	7-10	SEDI DUP	3-8[a]	3
Barium	6/6	90-126	SEDI DUP	20-60[a]	6
2-Butanone	6/1	0.01	OU-1 EC01	NA	NA
Cadmium	6/2	0.6-1	OU-1 EC01	1-10[a]	0
Chromium	6/6	16-23	SEDI DUP	25-75[a]	0
DDD	4/3	0.002	SED 1, SED 2, and SED 3	0.063[a]	0
DDT	4/4	0.003-0.008	SED 3	0.745[a]	0
DRO	6/6	22-97	SED 1	NA	NA
Lead	6/6	8-10	SEDI DUP, SED 3	110-60[a]	0
Methylene chloride	6/1	0.02	SED 1 DUP	0.427[a]	0
Naphthalene	6/2	0.0008-0.002	SED 1	0.407	0
Petroleum recoverable hydrocarbon	2/2	44-53	OU-1 EC01	NA	NA
1,2,3-Trichlorobenzene	6/2	0.0008-0.002	SED 1	NA	NA

Key at end of table.

Table 3-10 (Cont.)

a Sediment quality benchmark.

Key:

ARAR = Applicable or relevant and appropriate requirement.
DDD = Dichlorodiphenyldichloroethane.
DDT = Dichlorodiphenyltrichloroethane.
DRO = Diesel-range organics.
mg/kg = Micrograms per kilogram.
NA = Not applicable.
RBC = Risk-based concentration.

Table 3-11

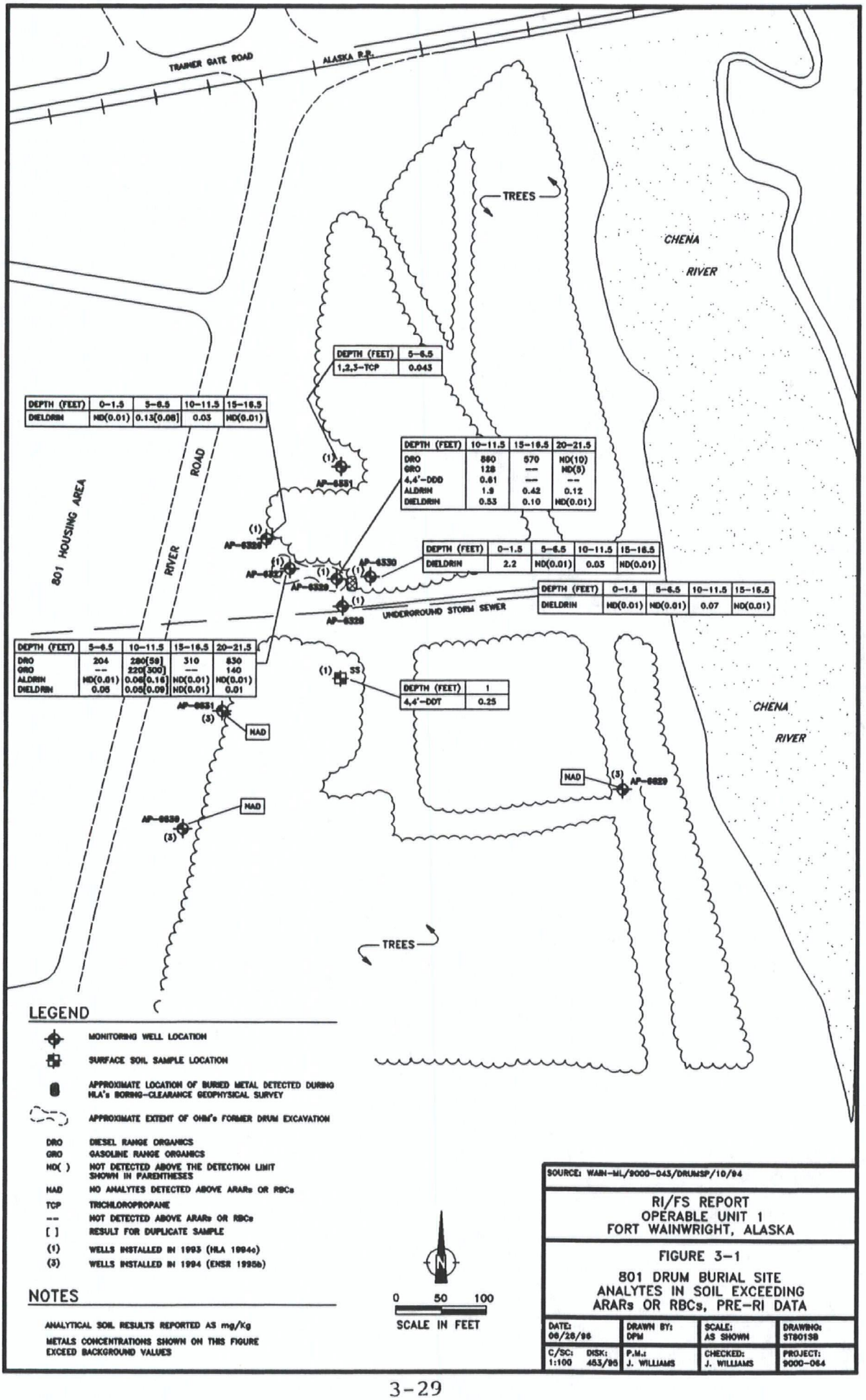
ANALYTES DETECTED IN SURFACE WATER DURING THE REMEDIAL INVESTIGATION
801 DRUM BURIAL SITE
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA
(µg/L)

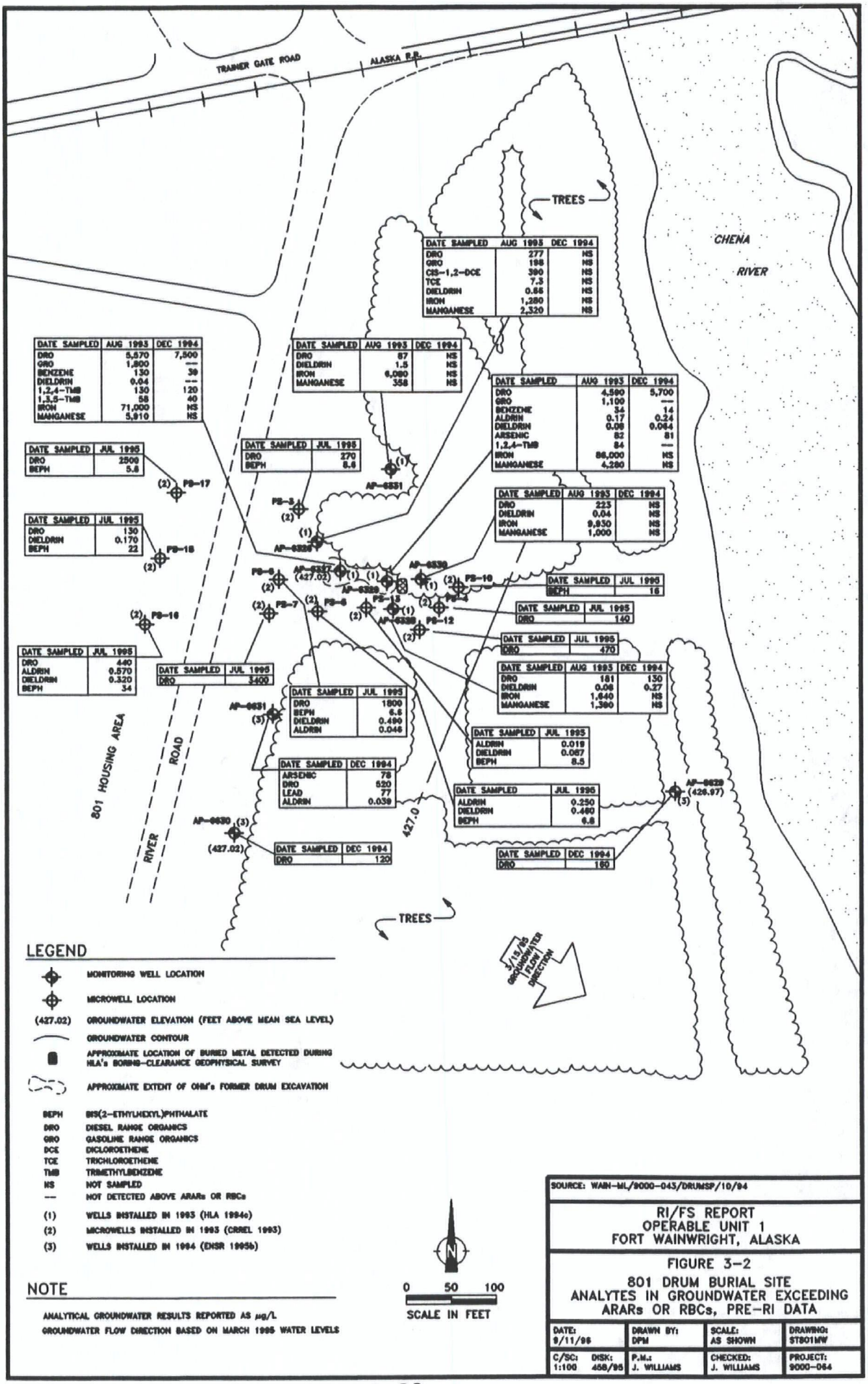
Analytes	Number of Samples/ Number of Detections	Range of Detected Concentrations	Risk-Based Screening or ARAR	Number of Samples Exceeding RBC
Arsenic	1/1	2	360/190[a]	0
Barium	1/1	38	61.1/38[b]	0

a National ambient water quality criteria for arsenic III (acute/chronic).
b Tier II value water quality criteria for barium: secondary acute/secondary chronic.

Key:

ARAR = Applicable or relevant and appropriate requirement.
µg/L = Micrograms per liter.
RBC = Risk-based concentration.


TRAINER GATE ROAD
ALASKA R.R.
TREES
CHENA
RIVER
801 HOUSING AREA
ROAD
RIVER
UNDERGROUND STORM SEWER
AP-6331
AP-6329
AP-6327
AP-6330
AP-6328
AP-6332
AP-6333
AP-6334
AP-6335
AP-6336
AP-6337
AP-6338
AP-6339
55
NAD
TREES
CHENA
RIVER
DEPTH (FEET) 5–6.5
1,2,5-TCP 0.043
DEPTH (FEET) 0–1.5 5–6.5 10–11.5 15–16.5
DIELDRIN ND(0.01) 0.13[0.08] 0.03 ND(0.01)
DEPTH (FEET) 10–11.5 15–16.5 20–21.5
DRO 860 570 ND(10)
GRO 128 — ND(5)
4,4'-DDD 0.61 — —
ALDRIN 1.9 0.42 0.12
DIELDRIN 0.53 0.10 ND(0.01)
DEPTH (FEET) 0–1.5 5–6.5 10–11.5 15–16.5
DIELDRIN 2.2 ND(0.01) 0.03 ND(0.01)
DEPTH (FEET) 0–1.5 5–6.5 10–11.5 15–16.5
DIELDRIN ND(0.01) ND(0.01) 0.07 ND(0.01)
DEPTH (FEET) 5–6.5 10–11.5 15–16.5 20–21.5
DRO 204 280[59] 310 830
GRO — 220[300] — 140
ALDRIN ND(0.01) 0.06 0.16 ND(0.01) ND(0.01)
DIELDRIN 0.06 0.05 0.09 ND(0.01) 0.01
DEPTH (FEET) 1
4,4'-DDT 0.25
LEGEND
MONITORING WELL LOCATION
SURFACE SOIL SAMPLE LOCATION
APPROXIMATE LOCATION OF BURIED METAL DETECTED DURING HLA's BORING-CLEARANCE GEOPHYSICAL SURVEY
APPROXIMATE EXTENT OF OHM's FORMER DRUM EXCAVATION
DRO DIESEL RANGE ORGANICS
GRO GASOLINE RANGE ORGANICS
ND( ) NOT DETECTED ABOVE THE DETECTION LIMIT SHOWN IN PARENTHESES
NAD NO ANALYTES DETECTED ABOVE ARARs OR RBCs
TCP TRICHLOROPROPANE
-- NOT DETECTED ABOVE ARARs OR RBCs
[ ] RESULT FOR DUPLICATE SAMPLE
(1) WELLS INSTALLED IN 1993 (HLA 1994c)
(3) WELLS INSTALLED IN 1994 (ENSR 1995b)
NOTES
ANALYTICAL SOIL RESULTS REPORTED AS mg/Kg
METALS CONCENTRATIONS SHOWN ON THIS FIGURE EXCEED BACKGROUND VALUES
N
0 50 100
SCALE IN FEET
SOURCE: WAIN-ML/9000-045/DRUMSP/10/94
RI/FS REPORT
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA
FIGURE 3-1
801 DRUM BURIAL SITE
ANALYTES IN SOIL EXCEEDING
ARARs OR RBCs, PRE-RI DATA
DATE: 06/26/96
DRAWN BY: DPM
SCALE: AS SHOWN
DRAWING: ST801SB
C/SC: 1:100
DISK: 463/95
P.M.: J. WILLIAMS
CHECKED: J. WILLIAMS
PROJECT: 9000-064



LEGEND

- MONITORING WELL LOCATION
- MICROWELL LOCATION
- (427.02) GROUNDWATER ELEVATION (FEET ABOVE MEAN SEA LEVEL)
- GROUNDWATER CONTOUR
- APPROXIMATE LOCATION OF BURIED METAL DETECTED DURING HLA's BORING-CLEARANCE GEOPHYSICAL SURVEY
- APPROXIMATE EXTENT OF OHM's FORMER DRUM EXCAVATION

BEPH	BIS(2-ETHYLHEXYL)PHTHALATE
DRO	DIESEL RANGE ORGANICS
GRO	GASOLINE RANGE ORGANICS
DCE	DICLOROETHENE
TCE	TRICHLOROETHENE
TMB	TRIMETHYLBENZENE
NS	NOT SAMPLED
—	NOT DETECTED ABOVE ARARs OR RBCs
(1)	WELLS INSTALLED IN 1993 (HLA 1994c)
(2)	MICROWELLS INSTALLED IN 1993 (CRREL 1993)
(3)	WELLS INSTALLED IN 1994 (ENSR 1995b)

NOTE

ANALYTICAL GROUNDWATER RESULTS REPORTED AS µg/L

GROUNDWATER FLOW DIRECTION BASED ON MARCH 1995 WATER LEVELS

N

0 50 100

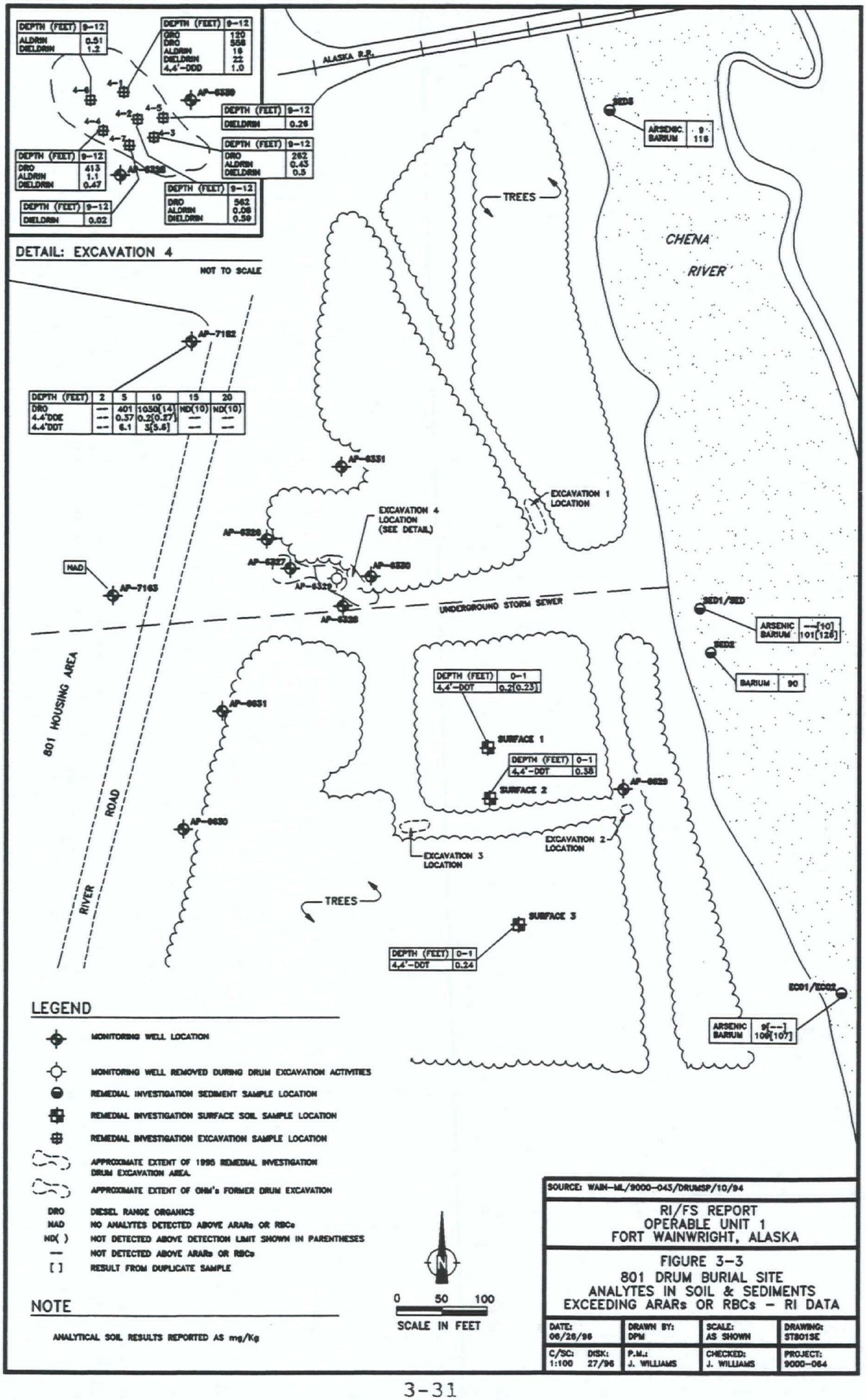
SCALE IN FEET

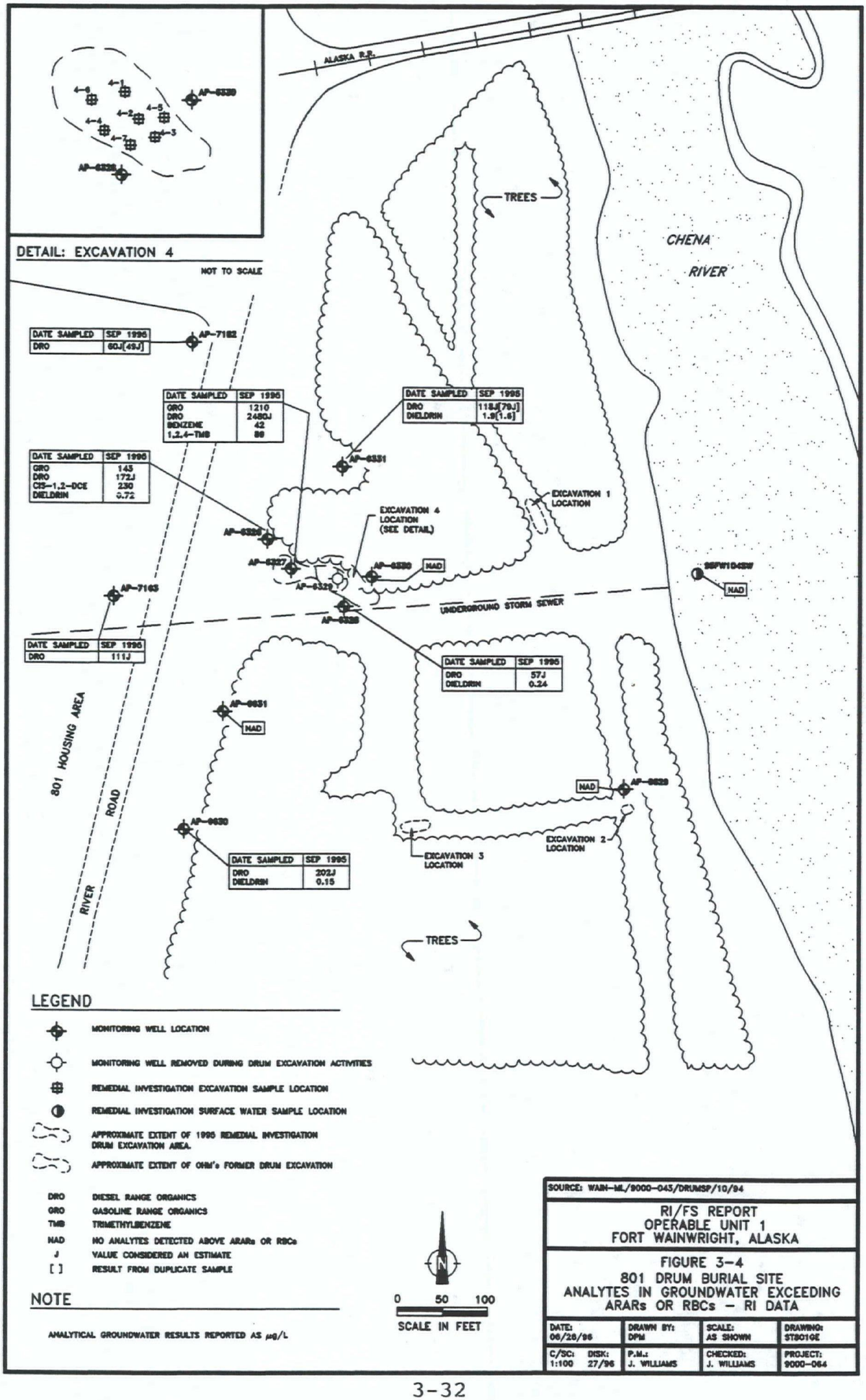
SOURCE: WAIN-ML/9000-043/DRUMSP/10/94

RI/FS REPORT
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA

FIGURE 3-2
801 DRUM BURIAL SITE
ANALYTES IN GROUNDWATER EXCEEDING ARARs OR RBCs, PRE-RI DATA

DATE: 9/11/95	DRAWN BY: DPM	SCALE: AS SHOWN	DRAWING: ST801MW
C/SC: 1:100 DISK: 458/95	P.M.: J. WILLIAMS	CHECKED: J. WILLIAMS	PROJECT: 9000-064


DETAIL: EXCAVATION 4
NOT TO SCALE
DEPTH (FEET) 9-12
ALDRIN 0.51
DIELDRIN 1.2
DEPTH (FEET) 9-12
GRO 120
DRO 558
ALDRIN 19
DIELDRIN 22
4,4'-DDD 1.0
DEPTH (FEET) 9-12
DIELDRIN 0.26
DEPTH (FEET) 9-12
DRO 262
ALDRIN 0.43
DIELDRIN 0.5
DEPTH (FEET) 9-12
DRO 413
ALDRIN 1.1
DIELDRIN 0.47
DEPTH (FEET) 9-12
DRO 582
ALDRIN 0.06
DIELDRIN 0.59
DEPTH (FEET) 9-12
DIELDRIN 0.02
AP-6330
AP-6329
4-1
4-2
4-3
4-4
4-5
4-6
4-7
ALASKA R.R.
SED8
ARSENIC 9
BARIUM 116
TREES
CHENA
RIVER
AP-7162
DEPTH (FEET) 2 5 10 15 20
DRO — 401 1030[14] ND(10) ND(10)
4,4'DDE -- 0.37 0.2[0.27] — —
4,4'DDT -- 6.1 3[5.6] — —
AP-6331
EXCAVATION 1 LOCATION
EXCAVATION 4 LOCATION (SEE DETAIL)
AP-6326
AP-6327
AP-6328
AP-6329
NAD
AP-7163
UNDERGROUND STORM SEWER
SED1/SED
ARSENIC —[10]
BARIUM 101[128]
SED2
BARIUM 90
801 HOUSING AREA
RIVER ROAD
AP-6331
DEPTH (FEET) 0-1
4,4'-DDT 0.2[0.23]
SURFACE 1
DEPTH (FEET) 0-1
4,4'-DDT 0.38
SURFACE 2
AP-6329
AP-6330
EXCAVATION 2 LOCATION
EXCAVATION 3 LOCATION
TREES
SURFACE 3
DEPTH (FEET) 0-1
4,4'-DDT 0.24
EC01/EC02
ARSENIC 9[---]
BARIUM 109[107]
LEGEND
MONITORING WELL LOCATION
MONITORING WELL REMOVED DURING DRUM EXCAVATION ACTIVITIES
REMEDIAL INVESTIGATION SEDIMENT SAMPLE LOCATION
REMEDIAL INVESTIGATION SURFACE SOIL SAMPLE LOCATION
REMEDIAL INVESTIGATION EXCAVATION SAMPLE LOCATION
APPROXIMATE EXTENT OF 1995 REMEDIAL INVESTIGATION DRUM EXCAVATION AREA
APPROXIMATE EXTENT OF OHM's FORMER DRUM EXCAVATION
DRO DIESEL RANGE ORGANICS
NAD NO ANALYTES DETECTED ABOVE ARARs OR RBCs
ND( ) NOT DETECTED ABOVE DETECTION LIMIT SHOWN IN PARENTHESES
— NOT DETECTED ABOVE ARARs OR RBCs
[ ] RESULT FROM DUPLICATE SAMPLE
NOTE
ANALYTICAL SOIL RESULTS REPORTED AS mg/Kg
N
0 50 100
SCALE IN FEET
SOURCE: WAIN-ML/9000-043/DRUMSP/10/94
RI/FS REPORT
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA
FIGURE 3-3
801 DRUM BURIAL SITE
ANALYTES IN SOIL & SEDIMENTS
EXCEEDING ARARs OR RBCs - RI DATA
DATE: 06/26/96
DRAWN BY: DPM
SCALE: AS SHOWN
DRAWING: ST801SE
C/SC: 1:100 DISK: 27/96
P.M.: J. WILLIAMS
CHECKED: J. WILLIAMS
PROJECT: 9000-064


DETAIL: EXCAVATION 4
NOT TO SCALE
AP-6329
AP-6328
4-1
4-2
4-3
4-4
4-5
4-6
4-7
ALASKA R.R.
TREES
CHENA
RIVER
DATE SAMPLED | SEP 1995
DRO | 60J[49J]
AP-7182
DATE SAMPLED | SEP 1995
GRO | 1210
DRO | 2480J
BENZENE | 42
1,2,4-TMB | 89
DATE SAMPLED | SEP 1995
DRO | 118J[79J]
DIELDRIN | 1.9[1.6]
AP-6331
DATE SAMPLED | SEP 1995
GRO | 145
DRO | 172J
CIS-1,2-DCE | 230
DIELDRIN | 0.72
EXCAVATION 1 LOCATION
EXCAVATION 4 LOCATION (SEE DETAIL)
AP-6326
AP-6327
AP-6330
NAD
AP-6329
SSFW104SW
NAD
AP-7163
UNDERGROUND STORM SEWER
AP-6328
DATE SAMPLED | SEP 1995
DRO | 111J
DATE SAMPLED | SEP 1995
DRO | 57J
DIELDRIN | 0.24
801 HOUSING AREA
ROAD
AP-6331
NAD
NAD
AP-6329
AP-6330
EXCAVATION 3 LOCATION
EXCAVATION 2 LOCATION
DATE SAMPLED | SEP 1995
DRO | 202J
DIELDRIN | 0.15
RIVER
TREES
LEGEND
MONITORING WELL LOCATION
MONITORING WELL REMOVED DURING DRUM EXCAVATION ACTIVITIES
REMEDIAL INVESTIGATION EXCAVATION SAMPLE LOCATION
REMEDIAL INVESTIGATION SURFACE WATER SAMPLE LOCATION
APPROXIMATE EXTENT OF 1995 REMEDIAL INVESTIGATION DRUM EXCAVATION AREA.
APPROXIMATE EXTENT OF OHM's FORMER DRUM EXCAVATION
DRO DIESEL RANGE ORGANICS
GRO GASOLINE RANGE ORGANICS
TMB TRIMETHYLBENZENE
NAD NO ANALYTES DETECTED ABOVE ARARs OR RBCs
J VALUE CONSIDERED AN ESTIMATE
[ ] RESULT FROM DUPLICATE SAMPLE
NOTE
ANALYTICAL GROUNDWATER RESULTS REPORTED AS µg/L
N
0 50 100
SCALE IN FEET
SOURCE: WAIN-ML/9000-045/DRUMSP/10/94
RI/FS REPORT
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA
FIGURE 3-4
801 DRUM BURIAL SITE
ANALYTES IN GROUNDWATER EXCEEDING ARARs OR RBCs - RI DATA
DATE: 06/28/96
DRAWN BY: DPM
SCALE: AS SHOWN
DRAWING: ST8010E
C/SC: 1:100
DISK: 27/96
P.M.: J. WILLIAMS
CHECKED: J. WILLIAMS
PROJECT: 9000-064

4.0 SUMMARY OF SITE RISKS

A Baseline Human Health and Ecological Risk Assessment is one mechanism for determining the need for taking action at the source areas and indicates the exposure pathways that need to be addressed by remedial action. Risk Assessments are performed using information regarding toxicity of contaminants and assumptions regarding the extent to which people may be exposed to them. The Risk Assessment evaluation was based on the Operable Unit 1 (OU-1) Remedial Investigation (RI). This summary of the Baseline Human Health Risk Assessment for the 801 Drum Burial Site source area is divided into the five following sections:

- Identification of contaminants of concern;
- Exposure assessment;
- Toxicity assessment;
- Risk characterization, which is an integration and summary of the information gathered and analyzed in the preceding sections; and
- Analysis of the uncertainty involved in developing the Risk Assessment.

The summary concludes with the results of the Ecological Risk Assessment conducted for the 801 Drum Burial Site source area.

Human Health and Ecological Risk Assessments were conducted for four of the OU-1 source areas (801 Drum Burial Site, Building 1599, Building 2077, and Site N-4) to determine the potential risk in the absence of remedial action. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) guidance allows the Baseline Human Health Risk Assessment to reflect the expected future use of a site. Scenarios involving future residential, recreational, and industrial use of the source areas were completed. However, future residential and recreational scenarios were determined to not be appropriate for Building 1599, Building 2077, and Site N-4 soils because industrial use is the reasonably anticipated future use, based on the post Master Plan and historical use of these three areas. The estimated cancer risks at Building 1599, Building 2077, and Site N-4 using the assumptions discussed above were below or within the acceptable risk range (see Table 2-1); these source areas will no longer be discussed in this Record of Decision. The current and future land uses at the 801 Drum Burial Site are recreational because the source area is located on the Chena River floodplain.

It was determined, because of source area hydrogeologic conditions, that future residential risks identified in the Baseline Human Health Risk Assessment are applicable to groundwater at the 801 Drum Burial Site because an exposure pathway for downgradient Municipal Utility System well users exists. Existing groundwater contaminant concentrations also exceed federal drinking water maximum contaminant levels (MCLs) and require remedial action because of downgradient groundwater users. The National Oil and Hazardous Substances Pollution Contingency Plan requires that groundwater be returned to its beneficial uses whenever practicable. The beneficial use is domestic water supply.

4.1 IDENTIFICATION OF CONTAMINANTS OF CONCERN (SCREENING ANALYSIS)

Selection of contaminants of concern, which are chemicals that potentially contribute to human health risks at the source areas, was a two-step process. First, the maximum concentrations of contaminants detected in on-site soil and water during the RI were compared to health-based screening levels for drinking water; soil, and air in accordance with United States Environmental Protection Agency (EPA), Region 10, Supplemental Risk Assessment Guidance. Region 10 recommends the use of EPA, Region 3, risk-based concentration values (June 1996). These concentrations reflect residential exposure assumptions and were modified as necessary to reflect excess lifetime cancer risks of 1×10^{-6} and 1×10^{-7} associated with groundwater and soil, respectively, or a hazard quotient of 0.1 for all media. Inorganic chemicals were compared statistically to naturally occurring background levels. If concentrations were found below established background levels, they were eliminated from further evaluation. Eighteen contaminants were identified as contaminants of concern in soil and groundwater at the 801 Drum Burial Site. While soil contamination did not pose a direct threat to human health, it does act as an ongoing source of contamination to groundwater. Table 4-1 presents the contaminants of concern identified in the environmental medium evaluated.

A supplemental 1996 investigation was conducted for the 801 Drum Burial Site after the RI. The investigation results showed that the contaminant levels were higher than the levels found in the RI. As a result, it is expected that the risk is higher than predicted in the OU-1 Baseline Risk Assessment. See the *801 Drum Burial Site Supplemental 1996 Investigation Report* in the Administrative Record for details.

4.2 EXPOSURE ASSESSMENT

The exposure assessment estimates the type and magnitude of exposures to the contaminants of concern at the source areas. It considers the current and potential future uses of the source area, characterizes the potentially exposed populations, identifies the important exposure pathways, and quantifies the intake of each contaminant of concern from each medium for each population at risk.

4.2.1 Identification of Site Uses, Exposed Populations, and Exposure Pathways

4.2.1.1 Source Area Land Use Scenarios

The exposure assessment for the 801 Drum Burial Site source area considers land use scenarios to evaluate exposed populations. The Baseline Human Health Risk Assessment evaluated future residential land use of the source area, which assumes that individuals would spend 30 years of their lifetime at the source area. Although this use scenario is unlikely, it provides a conservative Baseline to avoid underestimation of risks. The recreational exposure scenario assumes that an individual will spend five days a year for 30 years at the source area. Table 4-2 identifies the potential exposure routes evaluated for the Baseline Human Health Risk Assessment.

4.2.1.2 Exposed Populations and Pathways

An exposure pathway is the mechanism by which chemicals migrate from their source or point of release to the population at risk. Four elements comprise a complete exposure pathway: 1) a source of a chemical release, 2) movement of contaminants through environmental media, 3) a point of potential human contact with a contaminated medium, and 4) entry into the body or exposure route.

The exposure pathways considered in the Baseline Human Health Risk Assessment varied depending on the land use and on the population potentially exposed. The exposure assessment identified potential pathways for contaminants of concern to reach the exposed population at the 801 Drum Burial Site (see Table 4-2). A "complete" exposure pathway must exist for a contaminant to pose a human health risk (i.e., the potential for a receptor to be exposed to a contaminant must exist).

4.2.1.3 Calculation of Exposure

EPA's Superfund guidance requires that the reasonable maximum exposure be used to calculate potential health impacts at Superfund sites. The reasonable maximum exposure is the highest exposure that is reasonably expected to occur at the source area. It is calculated using conservative assumptions in order to represent exposures that are reasonable and protective. The Baseline Human Health Risk Assessment reasonable maximum exposure and average exposures were estimated for residential, industrial, and recreational land use scenarios.

To estimate exposure, data regarding the concentrations of contaminants of concern in the media of concern at the source area (the exposure point concentrations) are combined with information about the projected behaviors and characteristics of the people who potentially may be exposed to these media (exposure parameters). These elements are described below.

a) Exposure Point Concentrations. The 95% upper confidence limit (UCL) on the arithmetic mean was used to calculate exposure point concentrations (EPCs) for soil and groundwater reasonable maximum exposure scenarios, except where the 95% UCL exceeded the maximum contaminant concentration. Table 4-3 contains the exposure point concentrations for carcinogenic chemicals of potential concern in surface and subsurface soil, and groundwater at the 801 Drum Burial Site.

b) Exposure Parameters. The parameters used to calculate the reasonable maximum exposure include body weight, age, contact rate, frequency of exposure, and exposure duration. Exposure parameters were obtained from EPA, Region 10, Risk Assessment Guidance (*EPA 1991, Region X Supplemental Risk Assessment Guidance for Superfund*). The default exposure factors were modified to reflect site-specific climatological and other factors at Fort Wainwright. Site-specific exposure assumptions were made for soil contact, including ingestion, dermal contact, and inhaling dust, based on snow cover half the year. The exposure parameters used for the recreational user scenario are included in Table 4-4.

For the media evaluated, exposures were estimated assuming long-term exposures to source area contaminants. However, the risks associated with acute exposure to contents of drums were not assessed.

4.3 TOXICITY ASSESSMENT

The Baseline Human Health Risk Assessment provides toxicity information for the contaminants of

concern. Generally, cancer risks are calculated using toxicity factors known as *slope factors*, while noncancer risks rely on reference doses.

EPA has developed slope factors for estimating lifetime cancer risks associated with exposure to potential carcinogens. Slope factors are expressed in units of milligram per kilogram per day^{-1} (mg/kg-day^{-1}) and are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term *upper-bound* reflects the conservative estimate of the risks calculated from the slope factor. Use of this approach makes it highly unlikely that the actual cancer risk would be underestimated. Slope factors are derived from the results of human epidemiological studies or chronic animal bioassays to which mathematical extrapolations from high to low dose and from animal to human dose have been applied.

Reference doses have been developed to indicate the potential for adverse health effects from ingestion of potential contaminants of concern that exhibit noncancer effects, such as damage to organ systems (e.g., the nervous system and blood-forming system). They also are expressed in units of mg/kg-day. Reference doses are estimates within an order of magnitude of lifetime daily exposure levels for people, including sensitive individuals, who are likely to be without risk of adverse effects. Estimates of intakes of contaminants of concern from environmental media (e.g., the amount of a contaminant of concern ingested from contaminated drinking water) can be compared to the reference dose. Reference doses are derived from human epidemiological studies or from animal studies to which uncertainty factors have been applied.

The toxicity factors were drawn from the Integrated Risk Information System or, if no Integrated Risk Information System values were available, from the Health Effects Assessment Summary Tables. For chemicals that do not have toxicity values available at this time, other criteria, such as MCLs promulgated under the Safe Drinking Water Act, were used to assess potential hazards.

4.4 RISK CHARACTERIZATION

The purpose of the risk characterization is to integrate the results of the exposure assessment and the toxicity assessment to estimate risk to humans from exposure to site contaminants. Risks were calculated for carcinogenic and noncarcinogenic effects based on the reasonable maximum exposure (see exposure assessment discussion [Section 4.2]). To estimate cancer risk, the slope factor is multiplied by the exposure expected for that chemical to provide an upper-bound estimate of the excess lifetime cancer risk. This estimate is the incremental probability of an individual developing cancer over a lifetime as a result of exposure to cancer-causing chemicals at a source area. EPA considers that excess lifetime cancer risks between 1 in 1 million (1×10^{-6}) and 1 in 10,000 (1×10^{-4}) are within the generally acceptable range; risks greater than 1 in 10,000 usually suggest the need to take action at a site.

In defining effects from exposure to noncancer-causing contaminants, EPA considers acceptable exposure levels as those that do not adversely affect humans over their expected lifetime with a built-in margin of safety. Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as a hazard quotient, which is the ratio of the estimated exposure from a site's contaminant to that contaminant's reference dose. If this ratio, called a *hazard quotient*, is less than 1, then adverse noncancer health effects are not likely to occur. Hazard quotients for individual contaminants of concern are summed to yield a hazard index for the subarea. The potential excess

lifetime cancer risks and hazard indices described in this summary were calculated using reasonable maximum exposure assumptions.

4.4.1 801 Drum Burial Site Source Area

Table 4-5 presents excess lifetime cancer and noncancer risks for soil and groundwater for the 801 Drum Burial Site.

Table 4-6 shows the analyte-specific excess lifetime cancer risks for a future residential scenario for soil and groundwater. Under current land use conditions, the estimates of carcinogenic and noncarcinogenic effects for the 801 Drum Burial Site source areas fell within or below the acceptable risk range for the CERCLA sites. The future land use for the 801 Drum Burial Site was determined to be recreational. However, a residential scenario for groundwater use is considered appropriate and representative of risk to current downgradient users, given 801 Drum Burial Site hydrogeological conditions. When considering groundwater as a source of domestic water, several contaminants were detected in groundwater at concentrations above EPA's acceptable risk range for the 801 Drum Burial Site. These risk drivers include benzene; aldrin; dieldrin; 1,1-DCE; and vinyl chloride. Iron contributed to a hazard quotient in excess of 1 at the 801 Drum Burial Site groundwater. Note, however, that the iron concentrations detected at OU-1 reflect background concentrations in this mineralogically rich area.

Hazard indices associated with current and future use of the 801 Drum Burial Site soil did not exceed a hazard quotient of 1; they ranged from 0.004 to 0.2. Risks associated with current and future use of 801 Drum Burial Site soils do not exceed EPA's acceptable risk range. Risks associated with potential downgradient drinking water users do not exceed an excess lifetime cancer risk of 1×10^{-4}. The primary contaminants of concern in groundwater are benzene; aldrin; dieldrin; 1,1-DCE; and vinyl chloride. Hazard indices associated with future residential groundwater use ranged from 0.0005 to 6; the principal contaminants of concern were iron and manganese. These metals are considered to be naturally occurring.

4.5 MAJOR UNCERTAINTIES

Uncertainty is associated with every step of the risk assessment process. The principal uncertainties associated with the OU-1 risk assessment process, which could overestimate site-related risks and exposures, are summarized below:

- Toxicity data developed for animals were converted for use in humans, and toxicity studies at high doses were extrapolated to exposure levels;
- Nondetected contaminants of concern were assigned a value of one-half the method detection limit in the Risk Assessment evaluation; and
- Natural degradation was not factored into the calculation of exposure point concentrations.

Uncertainties that may serve to underestimate site-related risk and exposures include:

- Detected chemicals without toxicity values, data that do not meet quality objectives, or tentatively identified compounds are not evaluated as chemicals of potential concern;

- The minimum sample quantitation limit exceeded the risk-based concentration screening level for some analytes;

- The source area is used for recreational purposes; however, it is located adjacent to a residential area;

- The Risk Assessment was not conducted for potential exposure to drum contents and surrounding highly contaminated soils; and

- The Risk Assessment was conducted in 1995 and therefore does not include the 1996 Supplemental Investigation data.

In addition, surrogate compounds were used when toxicity data were unavailable. The actual toxicity for a compound may be greater or less than the surrogate, resulting in either overestimation or underestimation of risk.

4.6 ECOLOGICAL RISKS

An Ecological Risk Assessment addresses the current and future impacts and potential risks posed by contaminants to natural habitats, including plants and animals, in the absence of remedial action. The three main phases of the Ecological Risk Assessment are problem formulation, analysis, and risk characterization.

The following section presents a brief discussion of the Ecological Risk Assessment steps described above.

4.6.1 Problem Formulation

To narrow the scope and to focus the Ecological Risk Assessment on the most important aspects of OU-1, many steps were performed. A physical site description of the ecological features of interest at the 801 Drum Burial Site was prepared, and previous ecological investigations, including wildlife inventories and Environmental Impact Statements, were reviewed. A description of the regional and local ecology was completed. Threatened, endangered, sensitive, or rare species were identified.

Chemicals of potential ecological concern were identified by reviewing the 801 Drum Burial Site analytical database with regard to data quality, spatial representation, and adequacy for an Ecological Risk Assessment; frequency with which analytes are detected in environmental media; comparison to background concentrations; and comparison to ecological risk-based criteria for sediment and surface water. Next, pathways of contaminant migration and exposure were identified by evaluating sources of contaminants and the mechanisms by which they may be transported to media of ecological concern, plants, and animals.

Potential ecological effects are summarized by reviewing the toxicological literature. These summaries present a review of the known toxicological effects of the chemicals of potential ecological

concern on wildlife species.

Two types of ecological endpoints are considered in the Ecological Risk Assessment: assessment and measurement endpoints.

- Assessment endpoints are qualitative or quantitative expressions of the environmental values to be protected at the 801 Drum Burial Site and are selected by considering species that play important roles in community structure or function; species of societal significance or concern; species of concern to federal and state agencies; diet, habitat preference, and behaviors that predispose the species to chemicals of potential ecological concern exposure; amenability of the selected species to measurement or prediction of effects; and species that may be particularly sensitive to the chemicals of potential ecological concern identified at the 801 Drum Burial Site; and

- Measurement endpoints include the species and communities used to quantify the potential ecological impacts posed by OU-1 chemicals of potential ecological concern. Representative measurement species are selected based on the relative abundance of each species and establishing functional groups based on trophic level and preferred habitat. Representative indicator species then are selected based on the potential for exposure and the availability of toxicological data. The following measurement species and communities were selected for evaluation at the 801 Drum Burial Site: plants, masked shrews, and meadow voles.

The refined conceptual ecological exposure model for the 801 Drum Burial Site can be summarized by the following working hypotheses:

- Potential ecological risks may result from exposure of terrestrial wildlife to chemicals of potential ecological concern found in the surface soils at the 801 Drum Burial Site; and

- Potential ecological risk may result from exposure of aquatic organisms to chemicals of potential ecological concern found in surface water and sediment.

4.6.2 Analysis

The analysis phase of the Ecological Risk Assessment evaluates receptor exposure to chemicals of potential ecological concern and the potential adverse effects of that exposure. Analysis of exposure and effects is based on the ecological endpoints and refined conceptual site model derived during the problem formulation phase. Analysis comprises two principal components:

- Exposure assessment, in which exposure point concentrations and chemicals of potential ecological concern intakes for the measurement species are calculated; and

- Ecological effects assessment, in which toxicity benchmark values are derived from the literature and toxicological databases, and uncertainty factors are selected and applied to the toxicity benchmark values to yield toxicity reference values. The uncertainty factors are used to compensate for applying data derived from laboratory or domestic animal studies to free-ranging wildlife (for which little empirical data are available).

4.6.3 Risk Characterization

Risk characterization involves two major components: risk estimation and risk description.

4.6.3.1 Risk Estimation

Risk estimation involves calculating hazard quotients to assess potential ecological risks to measurement species and communities. This method involves comparing calculated exposure doses or media concentrations with toxicity reference values and/or experimentally derived risk-based concentrations. Ecological effects are quantified by calculating the ratio between a chemical of potential ecological concern's estimated intake or concentration and its corresponding toxicity reference value (i.e., the intake level or concentration at which no adverse ecological effects are expected to occur). If this ratio (i.e., the hazard quotient) exceeds 1, then adverse ecological effects may be expected for the chemical of potential ecological concern. The hazard quotients described in this summary were calculated using conservative reasonable maximum exposure assumptions.

The hazard quotients for each exposure pathway (e.g., soil ingestion and surface water ingestion) may be summed for each chemical of potential ecological concern to establish contaminant-specific hazard indices for each measurement species. The hazard indices provide a species- and contaminant-specific characterization of the potential ecological risks across all of the assessed exposure pathways. Finally, the hazard indices can be added across contaminants that have similar effects.

4.6.3.2 Risk Description

Risk description involves summarizing the ecological significance of the potential risks and presenting the uncertainties associated with the Ecological Risk Assessment.

The results of the Ecological Risk Assessment indicate that there is a potential for adverse effects to small mammals (e.g., shrews and voles) at the 801 Drum Burial Site, reflecting ecologically significant concentrations of dieldrin.

The habitat area in these locations has been altered significantly from the surrounding land. Specific species surveys and traps were not used. The actual number of animals that could be affected by these chemicals could be very low.

At the 801 Drum Burial Site, benthic (sediment-dwelling) invertebrates may be impacted slightly by metals, or DDT and DDD or their metabolites present in the sediments. These concentrations are consistent with postwide levels and most likely represent residues associated with historical aerial spraying of the Fairbanks area for mosquito control. These concentrations do not appear to be associated with a chemical release associated with 801 Drum Burial Site activities because the highest

concentrations were found in upgradient locations.

The Ecological Risk Assessment is subject to uncertainties because virtually every step in the risk assessment process involves assumptions using professional judgment. Principal uncertainties associated with the OU-1 Ecological Risk Assessment include the following:

- A limited number of samples was collected from the source areas, and the samples were biased toward areas of "expected" soil contamination. This is likely to result in an overestimation of potential risks to the OU-1 ecological receptors;
- Selection of indicator species and exposure parameters was based on best professional judgment;
- Phytotoxicity and sediment screening values were not available for several chemicals of potential ecological concern. In addition, the available screening values were not site-specific;
- The use of 95% UCLs or maximum detected concentrations likely overestimates exposure;
- Toxicity reference values were used for evaluating assessment endpoints; however, scaling factors had to be used in the development of toxicity reference values for certain chemicals of ecological concern, and toxicity reference values do not exist for the exposure pathways of concern;
- No pesticide data were available for downgradient Chena River sediment sampling locations;
- No organic data were collected for surface water samples;
- Surface soil ingestion was assumed to represent 100% of the masked shrew's diet. This assumption may overestimate exposure;
- Speculative assumptions were made to generate tentative toxicity reference values for inhalation by burrowers. It is unknown whether these assumptions underestimated or overestimated exposures; and
- Although no significant risks were indicated with the measured surface water concentrations in the Chena River, the collection of only one surface water sample allows for only limited analysis of potential impacts due to potential transport of chemicals of potential ecological concern from the source area.

The approach described in this Ecological Risk Assessment used realistic assumptions wherever possible; reasonable and conservative assumptions were used when empirical data were unavailable. As a consequence, potential ecological risks to OU-1 species are more likely to be overestimated than

underestimated.

Ecological risks have been calculated for small mammals (e.g., shrews and voles) at this source area using the contaminants of concern detected at this source area. However, these calculations are based on the most conservative estimates available. There is no indication of a risk to plants in the area. Complete details are available in the OU-1 RI Report dated September 1996.

Table 4-1

CHEMICALS OF CONCERN FROM HUMAN HEALTH RISK ASSESSMENT 801 DRUM BURIAL SITE OPERABLE UNIT 1 FORT WAINWRIGHT, ALASKA

Analyte	Soil	Groundwater
Inorganics		
Aluminum	—	X
Iron	—	X
Manganese	X	X
Pesticides/Polychlorinated Biphenyls		
DDD	X	—
DDE	X	—
DDT	X	—
Aldrin	X	X
Dieldrin	X	X
Volatile Organic Compounds		
1,1-Dichloroethene	—	X
1,2,4-Trimethylbenzene	—	X
1,3,5-Trimethylbenzene	—	X
1,3-Dichloropropane	—	X
Benzene	—	X
cis-1,2-Dichloroethene	—	X
n-Propylbenzene	—	X
p-Isopropylbenzene	—	X
trans-1,2-Dichloroethene	—	X
Vinyl chloride	—	X

Key:

— = Not identified as a chemical of concern in environmental media at this source area.
DDD = Dichlorodiphenyldichloroethane.
DDE = Dichlorodiphenyldichloroethene.
DDT = Dichlorodiphenyltrichloroethane.

Table 4-2

POTENTIAL EXPOSURE ROUTES
801 DRUM BURIAL SITE
FROM HUMAN HEALTH RISK ASSESSMENT
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA

Exposure Medium and Route	Commercial and Industrial Population	Future Residential	Site Visitors and Recreational Population
Groundwater			
Ingestion	—	X	—
Dermal contact	—	X	—
Air			
Inhalation of indoor vapors	X	X	—
Inhalation of fugitive dust (soil)	X	X	X
Surface Soil			
Ingestion	X	X	X
Subsurface Soil			
Ingestion	X (future)	X (future)	X (future)

Key:

— = Exposure of this population through this route is not likely to occur.
X = Exposure of this population through this route is likely to occur.

Table 4-3
SUMMARY OF COPCS, EXPOSURE POINT CONCENTRATIONS, AND RBC SCREENING LEVELS
801 DRUM BURIAL SITE

COPC	Maximum Detected	95% UCL	EPC*	RBC Screen	Notes
Surface Soil (mg/Kg)					
Manganese	3.75E+02	4.61E+02	3.75E+02	3.90E+01	10, 11
Aldrin (c)	Not Detected	4.78E-03	4.78E-03	3.80E-03	1, 2, 4, 5, 8, 9
Dieldrin (c)	2.20E+00	1.11E+00	1.11E+00	4.00E-03	8, 10
Subsurface Soil (mg/Kg)					
Manganese	3.24E+02	2.15E+02	2.15E+02	3.90E+01	10, 11
4,4'-DDD (c)	1.00E+00	1.01E-01	1.01E-01	2.70E-01	6, 8, 10
4,4'-DDE (c)	3.70E-01	4.21E-02	4.21E-02	1.90E-01	5, 6, 10
4,4'-DDT (c)	6.10E+00	6.78E-01	6.78E-01	1.90E-01	10
Aldrin (c)	2.20E+01	1.38E+00	1.38E+00	3.80E-03	8, 10
Dieldrin (c)	1.60E+01	1.01E+00	1.01E+00	4.00E-03	8, 10
Aggregate† Surface and Subsurface Soil (mg/Kg)					
Manganese	3.75E+02	2.55E+02	2.55E+02	3.90E+01	
4,4'-DDD (c)	1.00E+00	8.93E-02	8.93E-02	2.70E-01	
4,4'-DDE (c)	3.70E-01	3.80E-02	3.80E-02	1.90E-01	
4,4'-DDT (c)	6.10E+00	6.02E-01	6.02E-01	1.90E-01	
Aldrin (c)	2.20E+01	1.22E+00	1.22E+00	3.80E-03	
Dieldrin (c)	1.60E+01	9.41E-01	9.41E-01	4.00E-03	
Groundwater (µg/L)					
Aluminum	5.19E+03	2.83E+03	2.83E+03	3.70E+03	5, 6, 10
Iron	8.60E+04	6.27E+04	6.27E+04	1.10E+04	10
Manganese	5.91E+03	4.69E+03	4.69E+03	1.80E+02	10
Aldrin (c)	2.40E-01	4.82E-02	4.82E-02	4.00E-03	8, 10
Dieldrin (c)	1.90E+00	5.31E-01	5.31E-01	4.20E-03	8, 10
1,1-Dichloroethene (c)	5.70E+00	1.33E+00	1.33E+00	4.40E-02	7, 8, 10
1,2,4-Trimethylbenzene	1.30E+02	4.10E+01	4.10E+01	3.00E+01	10
1,3,5-Trimethylbenzene	5.80E+01	1.70E+01	1.70E+01	3.00E+01	6, 10
1,3-Dichloropropane	1.00E-01	3.57E-01	1.00E-01	7.70E-02	7, 8, 9, 10
Benzene (c)	1.40E+02	3.18E+01	3.18E+01	3.60E-01	8, 10
cis-1,2-Dichloroethene	3.90E+02	7.07E+01	7.07E+01	6.10E+01	10
n-Propylbenzene	2.10E+01	6.00E+00	6.00E+00	6.10E+00	6, 8, 10
p-Isopropyltoluene	6.40E+00	2.00E+00	2.00E+00	6.10E+00	6, 10
trans 1,2-Dichloroethene	5.00E+01	8.50E+00	8.50E+00	1.20E+01	6, 10
Vinyl chloride (c)	9.00E-01	8.86E-01	8.86E-01	1.90E-02	7, 8, 9, 10

Notes:

* Exposure Point Concentration (EPC) is the minimum of the Maximum Detected Result and the 95% Upper Confidence Level of Detected results and 1/2 Non-Detect values. The maximum detected concentration is used in the Shower Model.

RBC Screen is 1/10 of the EPA Region III RBC screening value except for carcinogens in water which are the actual Region III RBC values.

(c) carcinogen.

† Statistics based on combined surface and subsurface soil sample analytical results.

1. The maximum detected value does not exceed the RBC screen value.
2. The frequency of observation is less than 5%.
4. The maximum detected value does not exceed the RBC screen value, but included as part of a chemical class or family.
5. The 95% Upper Confidence Limit (UCL) of detected results is below the RBC screen value.
6. The 95% UCL of combined detect and ND data (using 1/2 of ND values) is below the RBC screen value.
7. The minimum ND value exceeds the RBC Value.
8. The maximum ND value exceeds the RBC Value.
9. The maximum ND value is greater than the maximum detected result.
10. The maximum detected result exceeds the RBC screen value.
11. The maximum detected result is below the soil nutrient benchmark level.

TABLE 4-4
EXPOSURE PARAMETERS
RECREATIONAL USER SCENARIO

Parameter	Term	Units	Value Assigned	Source / Assumption
Dosage from ingestion of soil:				
Exposure point concentration in soil	EPC	mg/Kg	chemical specific	Measured
Ingestion rate	IR	mg/day	100 mg/day	EPA Superfund SDEF
Fraction ingested	FI	unitless	1	Assumed (conservative)
Exposure frequency	EF	days/yr	5 days/year	EPA Exposure Factors Handbook (see text)
Exposure duration	ED	years	30 years	EPA Superfund SDEF - per future resident
Body weight	BW	Kg	70 Kg	EPA Superfund SDEF
Averaging time (carcinogenic)	AT	years	70 years	EPA Superfund SDEF
Averaging time (non-carcinogenic)	AT	years	30 years	EPA Superfund SDEF - per future resident
Dosage from inhalation of fugitive dust:				
Exposure point concentration in air	CA	mg/m^3	chemical specific	Calculated as EPC x VF
Inhalation rate	IR	m^3/day	20 m^3/day	EPA Superfund SDEF
Exposure frequency	EF	days/year	5 days/year	EPA Exposure Factors Handbook (see text)
Exposure duration	ED	years	30 years	EPA Superfund SDEF - per future resident
Body weight	BW	Kg	70 Kg	EPA Superfund SDEF
Averaging time (carcinogenic)	AT	years	70 years	EPA Superfund SDEF
Averaging time (non-carcinogenic)	AT	years	30 years	EPA Superfund SDEF - per future resident
Exposure point concentration in soil	EPC	mg/Kg	chemical specific	Measured
Soil to air eolation factor for particulates	SF	Kg/m^3	2.3 E-12 Kg/m^3	Calculated - see Appendix K
Particulate emission rate*	PE	$g/cm^2 \cdot s$	6.9E-14 $g/cm^2 \cdot s$	ASTM ES38-94
Width of source area*	W	cm	1500 cm	ASTM ES38-94
Correction factor*	CF	$cm^3 \cdot Kg/m^3 \cdot g$	1000 $cm^3 \cdot Kg/m^3 \cdot g$	ASTM ES38-94
Wind speed above ground surface*	WS	cm/s	225 cm/s	ASTM ES38-94
Ambient air mixing zone height*	MZ	cm	200 cm	ASTM ES38-94
* used in calculation of SF.				
Dosage from inhalation of soil vapors: No exposure - No volatile COPCs in surficial soils at any of the source areas				
Dosage from dermal contact with water: No exposure - Recreational user assumed to have no exposure to groundwater				
Dosage from ingestion of tap water: No exposure - Recreational user assumed to have no exposure to groundwater				
Dosage from inhalation of volatiles from household water use: No exposure - Recreational user assumed to have no exposure to groundwater				

TABLE 4-4 (cont.)
EXPOSURE PARAMETERS
RECREATIONAL USER SCENARIO

Parameter	Term	Units	Value Assigned	Source / Assumption
Dosage from dermal contact with surficial soils:				
Exposure point concentration in soil	EPC	mg/Kg	chemical specific	Measured
Skin absorbtion adjustment factor	AAF	unitless	chemical specific	See Table 6.1-9 for values
Skin surface area exposed (child, ages 0-6)	SA	cm^2	3900 cm^2	EPA Region 10 Reasonable maximum exposure (RME)
Skin surface area exposed (adult, summer)	SA	cm^2	5000 cm^2	EPA Region 10 RME - per future resident
Skin surface area exposed (adult, spring/fall)	SA	cm^2	1900 cm^2	EPA Region 10 RME - per future resident
Skin surface area exposed (adult, winter)	SA	cm^2	0	No exposure to soil during winter months
Contact rate	CR	mg/cm^2	1 mg/cm^2	EPA Region 10 RME
Soil to skin adherence factor	AF	unitless	1	EPA Region 10 RME
Exposure frequency (child, ages 0-6)	EF	days/year	5 days/year	EPA Exposure Factors Handbook (see text)
Exposure frequency (adult, summer)	EF	days/year	2 days/year	3 months/year
Exposure frequency (adult, spring/fall)	EF	days/year	3 days/year	4 months/year
Exposure frequency (adult, winter)	EF	days/year	0	No exposure to soil during winter months
Exposure duration (child, ages 0-6)	ED	years	6 years	EPA Superfund SDEF - per future resident
Exposure duration (adult)	ED	years	24 years	EPA Superfund SDEF - per future resident
Body weight (child, ages 0-6)	BW	Kg	15 Kg	EPA Superfund SDEF
Body weight (adult)	BW	Kg	70 Kg	EPA Superfund SDEF
Averaging time (carcinogenic)	AT	years	70 years	EPA Superfund SDEF
Averaging time (non-carcinogenic)	AT	years	30 years	EPA Superfund SDEF - per future resident

Note: Recreational exposure factors were derived from The Exposure Factors Handbook, EPA 1989.

Table 4-5

SUMMARY OF EXCESS LIFETIME CANCER RISKS AND NONCARCINOGENIC HAZARD INDICES
801 DRUM BURIAL SITE
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA

Exposure Pathway	Carcinogenic Risk	Noncarcinogenic Hazard Indices
Future Residential		
Soil	5×10^{-5}	2×10^{-1}
Groundwater	2×10^{-4}	7×10^{0}
Total	2×10^{-4}	8×10^{0}
Industrial Worker		
Soil	2×10^{-5}	6×10^{-2}
Groundwater	4×10^{-5}	3×10^{0}
Total	6×10^{-5}	3×10^{0}
Future Construction Worker		
Soil	5×10^{-6}	1×10^{-1}
Recreational User		
Soil	1×10^{-6}	4×10^{-3}

Table 4-6

SUMMARY OF EXCESS LIFETIME CANCER RISKS
FUTURE RESIDENTIAL SCENARIO
801 DRUM BURIAL SITE
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA

COPC	Excess Lifetime Cancer Risk				Percentage of Total Site ELCR
	Exposure Pathway			Total	
	Ingestion	Inhalation	Dermal		
Soil					
Manganese	NA	NA	NA	0 E+00	0.0%
Aldrin	7.3E-08	1.3E-14	1.7E-07	2 E-07	0.1%
Dieldrin	1.6E-05	2.7E-12	3.7E-05	5 E-05	25.1%
Total Pathway	**1.6E-05**	**2.8E-12**	**3.7E-05**	**5 E-05**	**25.2%**
Water					
Aluminum	NA	NA	NA	0 E+00	0.0%
Iron	NA	NA	NA	0 E+00	0.0%
Manganese	NA	NA	NA	0 E+00	0.0%
Aldrin	9.6E-06	NA	3.1E-08	1 E-05	4.6%
Dieldrin	1.0E-04	NA	3.2E-06	1 E-04	48.8%
1,1-Dichloroethene	9.4E-06	7.2E-07	3.0E-07	1 E-05	4.9%
1,2,4-Trimethylbenzene	NA	NA	NA	0 E+00	0.0%
1,3,5-Trimethylbenzene	NA	NA	NA	0 E+00	0.0%
1,3-Dichloropropane	8.0E-08	NA	2.1E-09	8 E-08	0.0%

Table 4-6

SUMMARY OF EXCESS LIFETIME CANCER RISKS
FUTURE RESIDENTIAL SCENARIO
801 DRUM BURIAL SITE
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA

COPC	Excess Lifetime Cancer Risk				Percentage of Total Site ELCR
	Exposure Pathway			Total	
	Ingestion	Inhalation	Dermal		
Benzene	1.1E-05	2.4E-06	4.5E-07	1 E-05	6.5%
cis-1,2-Dichloroethene	NA	NA	NA	0 E+00	0.0%
n-Propylbenzene	NA	NA	NA	0 E+00	0.0%
p-Isopropyltoluene	NA	NA	NA	0 E+00	0.0%
trans-1,2-Dichloroethene	NA	NA	NA	0 E+00	0.0%
Vinyl chloride	2.0E-05	8.0E-07	2.9E-07	2 E-05	9.9%
Total Pathway	**1.5E-04**	**4.0E-06**	**4.3E-06**	**2 E-04**	**74.8%**
Total Site	**1.7E-04**	**4.0E-06**	**4.2E-05**	**2 E-04**	**100.0%**

Key:

COPC =Chemicals of potential concern.
ELCR =Excess lifetime cancer risk.
NA =Not applicable.

5.0 DESCRIPTION OF ALTERNATIVES

5.1 NEED FOR REMEDIAL ACTION

Actual or threatened releases of hazardous substances from the 801 Drum Burial Site, if not addressed by the response actions selected in this Record of Decision, may present a threat to human health, welfare, or the environment. Remedial action is necessary at the 801 Drum Burial Site to protect human health and the environment.

Remedial action is necessary at the 801 Drum Burial Site for the following reasons:

- An unknown number of buried drums remaining on site could act as a continuous source of contamination to groundwater;
- Contaminated soil acts as an ongoing source of contamination to groundwater;
- Groundwater from the Tanana Basin alluvial aquifer is the only source of potable water for Fort Wainwright and the surrounding area. This aquifer is unconfined except in areas of permafrost. In addition, the source area is upgradient of Municipal Utility System (MUS) wells;
- Contaminant levels in the groundwater exceed state and federal maximum contaminant levels (MCLs) for benzene; aldrin; dieldrin; 1,1-DCE; and vinyl chloride;
- The 801 Drum Burial Site is adjacent to the Chena River. Groundwater discharges into the Chena River during periods of high precipitation. The Remedial Investigation (RI)/Feasibility Study determined that groundwater flow directions varied from month to month throughout the year at the 801 Drum Burial Site. The variation in groundwater flow direction was due, in part, to the influence of the Chena River. Because of the variability in the flows, an average direction has not been estimated for the 801 Drum Burial Site;
- There are potential ecological risks associated with contaminants in the soil and groundwater; and
- The source area is immediately adjacent to a residential area.

5.2 REMEDIAL ACTION OBJECTIVES

5.2.1 801 Drum Burial Site

The remedial action objectives (RAOs) for the 801 Drum Burial Site are as follows:

5.2.1.1 Groundwater

- Ensure that groundwater use at the 801 Drum Burial Site meets federal and state standards;

- Minimize potential migration of contaminated groundwater to the Chena River and downgradient drinking water wells; and

- Establish and maintain institutional controls to ensure that the groundwater will not be used until federal and state MCLs are attained, except for activities undertaken to initiate the selected remedies detailed in this ROD. Institutional controls include restrictions governing site access, construction, and well development or placement as long as hazardous substances remain on site at levels that preclude unrestricted use. The Army shall ensure compliance with the institutional controls in place at this site because noncompliance will violate a requirement of this ROD, therefore violates the Fort Wainwright Federal Facility Agreement between the Army, U.S. Environmental Protection Agency and Alaska Department of Environmental Conservation.

  To ensure long-term effectiveness of this remedy, the Army's permanent implementation processes and policies for implementing institutional controls will be developed through joint EPA, ADEC, and Army negotiations. These implementation processes and policies are intended to be in place before the OU-5 postwide ROD.

5.2.1.2 Soil

- Prevent further leaching of contaminants from soil to groundwater;

- Reduce risks associated with exposure to contaminated soil and drums; and

- Prevent migration of soil contaminants to groundwater, which could result in groundwater contamination and exceedances of state and federal MCLs and Alaska Water Quality Standards (AWQS; 18 Alaska Administrative Code [AAC] 70).

5.3 BASIS FOR CLEANUP LEVELS

The current and projected future land use for the 801 Drum Burial Site is recreational; however, the source area is adjacent to a military housing unit. Therefore, the source area is visited frequently by residents from the 801 Military Housing Area. The cleanup goal for soil is based on an excess lifetime cancer risk of 1×10^{-4} associated with a residential exposure scenario. This scenario is considered protective of the 801 Military Housing Area residents and recreational users. These soil concentrations also are considered to be protective of groundwater quality based on the fate and transport model conducted by the United States Environmental Protection Agency (EPA). The cleanup goals for groundwater are the federal and state drinking water MCLs or are based on an

excess lifetime cancer risk of 1×10^{-6} for a residential exposure scenario when an MCL is unavailable. The cleanup levels are protective of downgradient residential, commercial, and MUS well users.

5.4 SIGNIFICANT APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

A full list of applicable or relevant and appropriate requirements (ARARs) is in Section 8.2. The following ARARs are the most significant regulations that apply to the remedy selections for the 801 Drum Burial Site:

- Federal and state MCLs are relevant and appropriate for groundwater. This sets the active remediation goals for groundwater. AWQS (18 AAC 70) are also applicable; and

- National Oil and Hazardous Substances Pollution Contingency Plan (NCP) off-site disposal rules are applicable for disposal of drums and contaminated soil.

5.5 DESCRIPTION OF ALTERNATIVES

Preliminary remedial alternatives for the 801 Drum Burial Site are described below. Numerous assumptions were made to determine cleanup time frames. These assumptions include consistent contaminant concentrations in soil and groundwater and consistent groundwater flow direction. The assumption used to calculate a remedial time frame was that no new contaminant release occurs after drum removal. A biological half-life evaluation based on laboratory data and industry handbooks was used to calculate a remedial time frame for saturated and unsaturated soils. Costs should be considered estimates but are comparable within the alternatives provided for this source area. For costing purposes, groundwater monitoring/evaluation was based on a time frame of 20 years (The accuracy of a cost estimate beyond 20 years becomes increasingly suspect because of the limitations of the standard cost prediction mathematical models.).

5.5.1 Alternative 1: No Action

The no-action alternative for the 801 Drum Burial Site involves no environmental monitoring, institutional controls, or remedial action and would leave contaminated groundwater, approximately 2,350 cubic yards of chlorinated-pesticide contaminated soil, and an unknown number of drums in their current locations. The groundwater plume would continue to migrate in the direction of groundwater flow, potentially to the Chena River and the downgradient MUS wells. Because no monitoring of surface and subsurface soils and groundwater at the source area would take place under this alternative, the effectiveness of natural attenuation for reducing the contaminant concentrations would be unknown. Development of the no-action alternative is required by the NCP to provide a basis of comparison for the remaining alternatives, serving as a baseline reflecting current conditions without any cleanup effort. The no-action alternative was evaluated consistent with NCP requirements. No present worth, capital, operation and maintenance (O&M), or groundwater monitoring costs are associated with this no-action alternative.

Capital Cost: None
Annual O&M Cost: None

Total Cost (Present Worth): None

5.5.2 Alternative 2: Institutional Controls with Natural Attenuation with Groundwater Monitoring/Evaluation

Institutional controls for the 801 Drum Burial Site would include land- and groundwater-use restrictions, site access restrictions, and groundwater monitoring/evaluation. Institutional controls would minimize potential exposures to the contamination. Land use restrictions would prevent residential development and prohibit drilling of drinking water wells in the vicinity of, and downgradient of, the contaminated groundwater plume. Engineering and safety controls such as signs and fences would be located around the source area perimeter to restrict access and to warn the public of the contamination. Land and groundwater use restrictions would be incorporated into the Fort Wainwright Master Plan. The effectiveness of these controls would be evaluated periodically. Any potentially buried drums would remain in place under this alternative; thus, a potential contaminant source to soil and groundwater would exist. The Master Plan would specify that the potentially buried drums and contaminated soil excavated in the future must be handled properly and disposed of in accordance with state and federal regulations.

Establish and maintain institutional controls to ensure that the groundwater will not be used until federal and state MCLs are attained, except for activities undertaken to initiate the selected remedies detailed in this ROD. Institutional controls include restrictions governing site access, construction, and well development or placement as long as hazardous substances remain on site at levels that preclude unrestricted use. The Army shall ensure compliance with the institutional controls in place at this site because noncompliance will violate a requirement of this ROD, therefore violates the Fort Wainwright Federal Facility Agreement between the Army, U.S. Environmental Protection Agency, and Alaska Department of Environmental Conservation.

To ensure long-term effectiveness of this remedy, the Army's permanent implementation processes and policies for implementing institutional controls will be developed through joint EPA, ADEC, and Army negotiations. These implementation processes and policies are intended to be in place before the OU-5 postwide ROD.

Natural attenuation is the breakdown of contaminants through a variety of biological, chemical, or physical processes without artificial stimuli. Biological processes include aerobic and anaerobic biodegradation, and plant and animal uptake. Chemical reactions include ion exchange, complexation, and abiotic transformation. Physical phenomena that aid the natural attenuation processes include advection, dispersion, dilution, diffusion, volatilization, and sorption/desorption.

For the 801 Drum Burial Site, it is expected to take 100 years for natural attenuation of contaminants of concern to reach health-based cleanup levels, assuming that no additional releases occur from any remaining buried drums. This time estimation is based on a chemical half-life evaluation for aldrin and dieldrin. The effectiveness of natural attenuation in reducing contaminant levels will be evaluated through periodic groundwater monitoring/evaluation.

Environmental monitoring and data evaluation would be performed periodically to obtain information regarding the effectiveness of the natural attenuation process in remediating the contamination, as well as to track the extent of contaminant migration from the source area. To the extent practicable, this monitoring and evaluation will be conducted using the existing wells that are screened in geological

zones hydraulically connected to the contamination source, supplemented by installing additional groundwater monitoring wells when required. Upgradient wells would be used to provide information about the background groundwater quality. Downgradient wells are used to monitor the extent of contaminant migration, change in flow direction, or occurrence of degradation products to protect downgradient drinking water wells.

The monitoring requirement would target volatile organic compounds (VOCs) and pesticides, including the contaminants that were found to exceed the state and federal MCLs and the contaminants' potential degradation products as specified in the RAOs for the 801 Drum Burial Site. Sample collection, analysis, and data evaluation would continue until sufficient data regarding changes in contaminant plume migration (including potential seasonal fluctuations in groundwater contaminant concentrations) and attenuation rates are gathered. The frequency of monitoring would be defined specifically during the Remedial Design phase. For costing purposes, it is assumed that groundwater monitoring would be conducted annually for 20 years.

This alternative potentially could reduce the risks associated with the contaminants in soil and groundwater. However, a significant amount of uncertainty is associated with the effectiveness of natural attenuation. Moreover, under this alternative, any remaining buried drums likely will continue to release contaminants to the environment. This alternative would not prevent migration of groundwater into the Chena River or nearby drinking water wells in the short term. The estimated costs to implement this alternative are as follows:

Capital Cost: $169,192
Annual O&M Cost: $123,070 (20 years)
Total Cost (Present Worth): $2,630,592

5.5.3 Alternative 3: Soil Capping, Soil Vapor Extraction with Air Sparging to Treat Soil and Groundwater, and Natural Attenuation of Groundwater with Long-Term Monitoring/Evaluation

This alternative consists of soil capping of pesticide-contaminated soil and active treatment of VOC contaminants in soil and groundwater via soil vapor extraction (SVE) and air sparging (AS). Under this alternative, any remaining buried drums would act as a continuous source of contamination to the environment. Although the RI did not find soil contamination at levels above the acceptable risk range, the most contaminated soils are expected to be found associated with the buried drums. A low-permeability soil cap would be placed over the soil contaminated with pesticides at levels above an excess lifetime cancer risk of 1×10^{-6} for a residential scenario; capping of the source area would prevent dermal contact and ingestion of the pesticide-contaminated soil. This alternative will minimize surface water infiltration through contaminated soil, thus significantly reducing the downward migration of contaminants.

In addition to soil capping, this alternative consists of installing SVE wells and AS wells to treat the VOCs in soil and groundwater. SVE and AS wells typically are used together as an integrated treatment system. Implementing an SVE/AS system would consist of ambient air being injected into the aquifer using either compressors or forced air blowers. The air movement through groundwater would promote the release or stripping of volatile contaminants from the groundwater into the overlying soils. The resultant contaminated vapor in the soil and at the groundwater table then would be drawn to the surface by applying a vacuum to the vapor extraction wells. The extracted vapor

then would be channeled to a central treatment building. The vapor will be monitored and, if necessary, treated to meet air emission standards. In addition to the stripping effects of air injection into the contaminated aquifer, injection of air is expected to enhance biodegradation of contaminants in the groundwater and overlying soils.

Soil and groundwater would be treated until cleanup goals for volatile contaminants are met. Groundwater monitoring/evaluation would be performed to assess the effectiveness of SVE/AS and to ensure that volatile and pesticide contamination do not migrate via the natural groundwater flow. In addition, groundwater monitoring/evaluation would be performed to determine the extent and migration of pesticide contamination because pesticide contamination would not be actively remediated under this alternative.

Buried drums potentially would remain in place under this alternative, and the drums could act as continuous sources of contamination to soil and groundwater. The Master Plan would specify that any remaining drums and associated contaminated soil excavated in the future must be handled and disposed of properly in accordance with state and federal regulations.

This alternative is projected to achieve cleanup levels for volatile organic contaminants in approximately five to 10 years. Natural attenuation of pesticide-related contaminants is estimated to take approximately 100 years to reach the cleanup goals, if no additional releases from the drums occur.

This alternative would prevent dermal exposure to pesticide-contaminated surface soil, and it would reduce risks associated with ingestion of volatile contaminants in surface and subsurface soil and groundwater. Long-term institutional controls also would be included to prevent future residential development and to restrict the use of groundwater. For costing purposes, it is assumed that groundwater monitoring would be conducted annually for 20 years.

Establish and maintain institutional controls to ensure that the groundwater will not be used until federal and state MCLs are attained, except for activities undertaken to initiate the selected remedies detailed in this ROD. Institutional controls include restrictions governing site access, construction, and well development or placement as long as hazardous substances remain on site at levels that preclude unrestricted use. The Army shall ensure compliance with the institutional controls in place at this site because noncompliance will violate a requirement of this ROD, therefore violates the Fort Wainwright Federal Facility Agreement between the Army, U.S. Environmental Protection Agency, and Alaska Department of Environmental Conservation.

To ensure long-term effectiveness of this remedy, the Army's permanent implementation processes and policies for implementing institutional controls will be developed through joint EPA, ADEC, and Army negotiations. These implementation processes and policies are intended to be in place before the OU-5 postwide ROD.

Estimated costs to implement this alternative are as follows:

Capital Costs: $292,547
Annual O&M Costs: $155,920 (20 years)
Total Costs (Present Worth): $3,410,941

5.5.4 Alternative 4: Drum Removal and Disposal, and Natural Attenuation of Groundwater with Long-Term Groundwater Monitoring/Evaluation with Institutional Controls with a Contingency for Soil Vapor Extraction and Air Sparging to Treat Soil and Groundwater

Alternative 4 involves using geophysical equipment to locate areas of possible buried drums that would be excavated and subsequently removed and disposed of. Because the additional drums are suspected to be a continuing source of soil and groundwater contamination, this alternative would effectively remove the main source of contamination at the source area. The estimated excavation depth is 15 feet below ground surface. It is assumed that approximately 500 drums would be located, removed, and disposed of and that half of them would require off-site disposal to a permitted hazardous waste disposal facility. Approximately 2,350 cubic yards of soils is expected to be excavated during the drum removal operation. Of that sum, approximately 650 cubic yards of soils is expected to be contaminated. Excavated soil designated as a hazardous waste under RCRA through laboratory analysis would be disposed of at an off-site, permitted hazardous waste disposal facility. If the current Treatability Study using rhizosphere-enhanced phytoremediation proves successful, then excavated pesticide-contaminated soil will be treated on Fort Wainwright. Excavated soil not regulated under RCRA as a hazardous waste would be disposed of at the Fort Wainwright Landfill. The excavation would be backfilled with clean soil.

In addition to drum removal, this alternative also consists of institutional controls, and long-term groundwater monitoring with a contingency of SVE/AS. Institutional controls will be initiated and maintained to prevent the use of contaminated groundwater at this source area and to establish restrictions governing site access, construction of new facilities, and well development as long as hazardous substances remain on site at levels that preclude unrestricted use. Because the drums are suspected to be the source of soil and groundwater contamination, it is expected that contamination, after removal of the drums, would decrease noticeably with time because of natural attenuation. Long-term groundwater monitoring/evaluation would confirm the progress of natural attenuation. The contingency would be implemented if: 1) the concentration of contaminants within the identified groundwater plume shows an increasing trend over any three consecutive sampling events throughout the 20-year monitoring period, or 2) the designated monitoring points around the plume indicate that contaminants are migrating away from the source area. The contingent remedy of an SVE/AS system would be the same as that described in Alternative 3. The SVE/AS system would reduce the levels of volatile contaminants of concern. For the pesticide contamination, the agencies may consider a treatment technology if one becomes available. Long-term groundwater monitoring/evaluation would continue until the contaminants in soil and groundwater are reduced to the cleanup levels. Site access will be restricted during all phases of construction.

If use of the SVE/AS contingency is needed as discussed above, cleanup levels for volatile organic contaminants should be reached within five to 10 years. For costing purposes, it is assumed that SVE/AS would be used for approximately five years. Natural attenuation of other contaminants of concern at the site (e.g. pesticides) will take approximately 100 years to achieve cleanup levels.

Establish and maintain institutional controls to ensure that the groundwater will not be used until federal and state MCLs are attained, except for activities undertaken to initiate the selected remedies detailed in this ROD. Institutional controls include restrictions governing site access, construction, and well development or placement as long as hazardous substances remain on site at levels that preclude unrestricted use. The Army shall ensure compliance with the institutional controls in place at this site because noncompliance will violate a requirement of this ROD, therefore violates the Fort

Wainwright Federal Facility Agreement between the Army, U.S. Environmental Protection Agency, and Alaska Department of Environmental Conservation.

To ensure long-term effectiveness of this remedy, the Army's permanent implementation processes and policies for implementing institutional controls will be developed through joint EPA, ADEC, and Army negotiations. These implementation processes and policies are intended to be in place before the OU-5 postwide ROD.

Estimated costs associated with this alternative without the SVE/AS contingency are as follows:

Capital Costs: $2,652,668
Annual O&M Costs: $122,476 (20 years)
Total Costs (Present Worth): $5,102,195

Estimated costs associated with this alternative with the SVE/AS contingency are as follows:

Capital Costs: $2,806,386
Annual O&M Costs: $138,406 (20 years)
Total Costs (Present Worth): $5,574,518

5.5.5 Alternative 5: Drum Removal and Disposal with Institutional Controls, and Long-Term Groundwater Monitoring/Evaluation with Contingency of Groundwater Extraction and Treatment

Removal of drums and soil, and long-term groundwater monitoring/evaluation, would be conducted as described in Alternative 4, which has a contingent remedy of groundwater extraction and treatment.

Under this alternative, groundwater extraction and treatment would be implemented if the concentration of contaminants within the identified groundwater plume increases with time or if the concentration of contaminants at monitoring points around the plume exceeds groundwater cleanup levels. Groundwater would be treated using air stripping or carbon adsorption techniques. Contaminated groundwater would be pumped to the surface and collected in large holding tanks. The treatment process involves introducing air through the contaminated water to evaporate or strip off VOCs. Treated groundwater would be discharged to the sanitary sewer.

The number of groundwater extraction wells would be determined based on the results of further exploratory drilling, which would be a component of a Remedial Design. Groundwater pumping rates would be established through groundwater pumping tests to provide hydraulic control of the contaminant plume. VOC emissions from an air stripping system would be monitored and, if necessary, treated to meet air emission standards.

This alternative would remove potential contamination sources. This alternative also would reduce risks associated with all contaminants in groundwater and prevent contaminant migration. Groundwater extraction and treatment (VOCs and pesticides) are projected to achieve cleanup goals in approximately five years. Natural attenuation of pesticide-related contaminants would take approximately 100 years, assuming that no additional releases occur. If the contingency is implemented, groundwater extraction and treatment (VOCs and pesticides) are projected to achieve cleanup goals in approximately five years.

Establish and maintain institutional controls to ensure that the groundwater will not be used until federal and state MCLs are attained, except for activities undertaken to initiate the selected remedies detailed in this ROD. Institutional controls include restrictions governing site access, construction, and well development or placement as long as hazardous substances remain on site at levels that preclude unrestricted use. The Army shall ensure compliance with the institutional controls in place at this site because noncompliance will violate a requirement of this ROD, therefore violates the Fort Wainwright Federal Facility Agreement between the Army, U.S. Environmental Protection Agency, and Alaska Department of Environmental Conservation.

To ensure long-term effectiveness of this remedy, the Army's permanent implementation processes and policies for implementing institutional controls will be developed through joint EPA, ADEC, and Army negotiations. These implementation processes and policies are intended to be in place before the OU-5 postwide ROD.

Estimated costs associated with this alternative without the groundwater extraction and treatment contingency are as follows:

Capital Costs: $2,652,668
Annual O&M Costs: $122,476 (20 years)
Total Costs (Present Worth): $5,102,195

Estimated costs associated with this alternative with the groundwater extraction and carbon treatment contingency are as follows:

Capital Costs: $8,315,899
Annual O&M Costs: $141,213
Total Costs (Present Worth): $11,140,174

6.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

In accordance with federal regulations, the five alternatives for the 801 Drum Burial Site were evaluated based on the nine criteria presented in the National Oil and Hazardous Substances Pollution Contingency Plan.

6.1 801 DRUM BURIAL SITE (COMPARATIVE ANALYSIS OF ALTERNATIVES)

6.1.1 Threshold Criteria

6.1.1.1 Overall Protection of Human Health and the Environment

All of the alternatives, except Alternative 1, the no-action alternative, are protective of human health and the environment. Because the no-action alternative does not meet this threshold criterion, it will not be considered further in this analysis.

Alternatives 4 and 5 would provide the most protection to human health and the environment by removing the contamination source. Both alternatives reduce risk associated with potential exposure to the sources of contamination. Contaminant source removal (drum and soil removal) also would prevent further leaching of contaminants to the groundwater. The contaminants in the groundwater would be expected to attenuate naturally. The groundwater monitoring/evaluation would ensure that groundwater meets federal drinking water standards. Groundwater would be sampled at monitoring points around the contaminant plume to ensure that contamination does not migrate from the source area. The groundwater also would be sampled within the contaminant plume to assess the progress of natural attenuation.

If the groundwater contingent remedies are implemented, Alternative 5 would provide a higher level of overall protection than Alternative 4 because the groundwater would be extracted and treated for all contaminants.

Alternatives 2 and 3 are less protective than Alternatives 4 and 5 because potential sources of contamination would remain in place. Alternative 3 would protect human health and the environment by reducing the possibility of human contact with contaminants and minimizing future infiltration of contaminant concentrations in the soil and groundwater. Alternative 2 would rely on natural processes to slowly decrease contaminant concentrations in the soil and groundwater. Alternative 2 would provide some protection of human health and the environment through institutional controls, which would reduce contact with contamination.

6.1.1.2 Compliance with Applicable or Relevant and Appropriate Requirements

Potential applicable or relevant and appropriate requirements (ARARs) include State of Alaska Water Quality Standards, State of Alaska Drinking Water Standards (state maximum contaminant levels [MCLs]), the Safe Drinking Water Act (federal MCLs), the Clean Water Act (a federal regulation governing wastewater discharge), State of Alaska Solid Waste Management Regulations, State of Alaska Hazardous Waste Regulations, the Resource Conservation and Recovery Act (federal hazardous waste regulations), the National Historic Preservation Act of 1966, and Army Regulations AR200-2 and AR210-20.

Alternatives 3, 4, and 5 are expected to meet all state and federal ARARs. Alternatives 4 and 5 include removal and disposal of drums and soil, and would comply with all ARARs. By removing the major sources of contamination, Alternatives 4 and 5 would be expected to achieve groundwater cleanup levels more quickly than Alternatives 2 and 3. In all alternatives, State of Alaska Water Quality Standards would be achieved through natural attenuation.

6.1.2 Primary Balancing Criteria

6.1.2.1 Long-Term Effectiveness and Permanence

Alternatives 4 and 5 would involve permanent reduction of soil and groundwater contamination because major sources of contamination (drums and soil) would be removed. The excavation area would be backfilled with clean soil. None of the contaminants would be addressed by Alternatives 2 and 3, except through natural processes. Therefore, Alternatives 2 and 3 would provide the least effective long-term permanence.

Without the groundwater contingency for Alternatives 4 and 5, all of the alternatives rate similarly in long-term effectiveness and permanence for addressing the groundwater contamination. Natural attenuation is recommended for addressing the contaminants in groundwater for Alternatives 2, 3, 4, and 5. Long-term groundwater monitoring/evaluation would assess the effectiveness of natural attenuation.

If the groundwater contingent remedy is implemented, groundwater extraction and treatment proposed in Alternative 5 would not be expected to be effective in the long run because of the hydrogeological conditions at Fort Wainwright. The aquifer at Fort Wainwright has high transmissivity and a low hydraulic gradient, which would increase the difficulty in effectively extracting the groundwater contaminants. It would be difficult to pump groundwater at the 801 Drum Burial Site without pumping clean river water. Therefore, Alternative 4 provides the most effective long-term permanence.

6.1.2.2 Reduction of Toxicity, Mobility, and Volume Through Treatment

Alternative 3 would reduce toxicity associated with volatile organic compounds through treatment and reduce the possibility of pesticide contaminants leaching to groundwater by restricting future infiltration of rainfall and snowmelt through contaminated soils to groundwater. Without the groundwater contingency, Alternatives 2, 4, and 5 would slowly decrease the toxicity and volume of the groundwater contaminants through natural attenuation. If the groundwater contingency is implemented, Alternatives 4 and 5 would involve treatment technologies that reduce toxicity and mobility of groundwater contaminants.

6.1.2.3 Short-Term Effectiveness

Dust, noise, and truck traffic are expected with Alternatives 4 and 5 because of drum excavation and removal. Short-term impacts from noise and dust could be controlled through protective equipment for workers and dust control measures. Workers would use protective clothing and respirators if required. Decontamination procedures would be in place to prevent tracking of chemicals off site. Truck routes could be established to minimize truck traffic problems near the 801 Military Housing Area. Removal of drums and soil would take two months to complete.

If the groundwater contingent remedy is implemented, groundwater extraction and treatment proposed in Alternative 5 would not be expected to be effective in the long run because of the hydrogeological conditions at Fort Wainwright. The aquifer at Fort Wainwright has high transmissivity and a low hydraulic gradient, which would increase the difficulty in effectively extracting the groundwater contaminants. It would be difficult to pump groundwater at the 801 Drum Burial Site without pumping clean river water. Therefore, Alternative 4 provides the greatest degree of short-term effectiveness.

If the groundwater contingency plan is implemented, Alternative 5 would have the greatest short-term risks because it involves construction and operation of a groundwater extraction and treatment system. It would take 18 months to install the groundwater extraction and treatment system. Alternative 4 would have lower short-term risks because it does not include extraction of contaminated groundwater. Installation and operation of the in situ soil vapor extraction (SVE) and air sparging (AS) would not be expected to affect workers or the community. It would take six months to complete the installation of the SVE and AS systems.

Alternative 3 has fewer short-term impacts because no drum or soil removal would occur. Capping would take a short time to construct and would pose limited and controllable short-term risks from heavy equipment movement and dust. It would take about six months to complete capping and the SVE and AS system.

Alternative 2 has the least amount of short-term impacts because no physical work is required other than fencing the source area and posting warning signs. It would take 10 months to implement these control measures.

Assuming that no additional releases of contaminants to the groundwater occur, it would take 100 years for pesticide contaminants to reach cleanup levels via natural attenuation. Alternatives 3 and 4 would take five years to 10 years to reach cleanup levels for the volatile contaminants. Alternative 5 would take five to 10 years for the volatile contaminants to reach the cleanup levels.

6.1.2.4 Implementability

All alternatives are technically and administratively feasible, and the required goods and services are readily available. Alternative 2 is readily implementable because it requires only institutional controls and monitoring. A soil cap could be implemented readily with Alternative 3. SVE and AS is a technology that has been used on Fort Wainwright extensively to clean up petroleum, oil, and lubricant contamination. Alternatives 4 and 5 would require a pilot study and testing of the contingency systems during installation to determine the exact configuration and spacing, and optimum operating conditions would be required. Alternatives 4 and 5 would be slightly more complicated because drum and soil removal depend on the technology available to locate the drums.

If the groundwater contingent remedy is implemented, groundwater extraction and treatment proposed in Alternative 5 would not be expected to be effective in the long run because of the hydrogeological conditions at Fort Wainwright. The aquifer at Fort Wainwright has high transmissivity and a low hydraulic gradient, which would increase the difficulty in effectively extracting the groundwater contaminants. It would be difficult to pump groundwater at the 801 Drum Burial Site without pumping clean river water. Therefore, Alternative 4 is the most easily implemented alternative.

If the groundwater contingency is implemented, Alternative 5 would be more complicated than Alternative 4 because of the hydrogeologic conditions on Fort Wainwright and the extreme weather conditions in Fairbanks.

6.1.2.5 Cost

The total costs of the alternatives are summarized in Table 6-1 and are based on the information available at the time the alternatives were developed. These costs are estimated for purposes of comparison and are considered to be accurate to within -30% to +50%. Costs are described using the present worth methodology with a discount rate equal to 5%. Cost estimates include direct and indirect capital costs, as well as annual operation and maintenance costs.

Without the groundwater contingency remedies for Alternatives 4 and 5, the two alternatives contain the same remedial components and cost the same. With the contingent groundwater remedy, Alternative 5 is the most expensive option, and it is $6 million more than Alternative 4. Alternatives 3 and 4 differ by only $1.5 million. Alternative 2 is the least expensive.

A detailed cost analysis is provided in Appendix C.

6.1.3 Modifying Criteria

6.1.3.1 State Acceptance

The Alaska Department of Environmental Conservation (ADEC) has been involved with the development of remedial alternatives for Operable Unit 1 and concurs with the selected alternative.

6.1.3.2 Community Acceptance

The Army, ADEC, and the United States Environmental Protection Agency invited the public to comment on the Proposed Plan during the public comment period from March 4, 1997, through April 3, 1997. No official comments from the public were received on this Proposed Plan, so the agencies assume that the community accepts this decision and states this in the Responsiveness Summary (see Appendix B).

Table 6-1

801 DRUM BURIAL SITE
COST COMPARISON TABLE
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA

Alternative	Estimated Construction Costs ($)	Estimated Annual O&M Costs ($)	Years in Present Worth Analyses	Estimated Total Costs ($)
1: No Action	0	0	0	0
2: Institutional Controls with Natural Attenuation with Groundwater Monitoring	169,192	123,070	20	2,630,592
3: Soil Capping and Soil Vapor Extraction with Air Sparging with Groundwater Monitoring	292,547	155,920	20	3,410,941
4: Drum Removal and Disposal and Long-Term Groundwater Monitoring	**2.652,668**	**122,476**	**20**	**5,102,195**
(With Contingent Soil Vapor Extraction with Air Sparging)	**2,806,386**	**138,406**	**20**	**5,574,518**
5: Drum Removal and Disposal and Long-Term Groundwater Monitoring	2.652,668	122,476	20	5,102,195
(With Contingency of Groundwater Extraction and Treatment)	8,315,899	141,213	20	11,140,174

Key:

O&M = Operation and maintentance.

7.0 SELECTED REMEDY

7.1 801 DRUM BURIAL SITE

After a thorough assessment of the various alternatives for the 801 Drum Burial Site, the agencies determined that Alternative 4 is the preferred alternative. Alternative 4 would protect human health and the environment and meet all applicable or relevant and appropriate requirements. In addition, it also provides the best balance of the nine Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) criteria. This alternative involves:

- Locating any potentially buried drums and removing and disposing of drums and contaminated soil, if found, and restricting access to the site during execution of the work;

- Establish and maintain institutional controls to ensure that the groundwater will not be used until federal and state maximum contaminant levels (MCLs) are attained, except for activities undertaken to initiate the selected remedies detailed in this ROD. Institutional controls include restrictions governing site access, construction, and well development or placement as long as hazardous substances remain on site at levels that preclude unrestricted use. The Army shall ensure compliance with the institutional controls in place at this site because noncompliance will violate a requirement of this ROD, therefore violates the Fort Wainwright Federal Facility Agreement between the Army, U.S. Environmental Protection Agency, and Alaska Department of Environmental Conservation.

  To ensure long-term effectiveness of this remedy, the Army's permanent implementation processes and policies for implementing institutional controls will be developed through joint EPA, ADEC, and Army negotiations. These implementation processes and policies are intended to be in place before the OU-5 postwide ROD;

- Natural attenuation with long-term groundwater monitoring/evaluation;

- A groundwater contingent remedy, which includes a soil vapor extraction (SVE)/air sparging (AS) treatment system. The system would be implemented to treat the volatile contaminants when either the concentration of contaminants in the groundwater plume shows an increasing trend over any three consecutive sampling events or the designated monitoring points around the plume indicate that contaminants are migrating away from the source area; and

- For the pesticide contamination, the agencies may consider a treatment technology, if one becomes available.

Alternative 4 is expected to meet the remedial action objectives. Removal of the main sources of contamination would reduce the risk associated with exposure to drums and contaminated soil, and it would minimize further contamination of the groundwater. Natural attenuation of the contaminants in

groundwater would occur over time and is expected to meet Alaska Water Quality Standards (AWQS; 18 Alaska Administrative Code [AAC] 70). Groundwater monitoring/evaluation would be implemented to track the progress of natural attenuation and to ensure that the groundwater downgradient from the source area remains unaffected by the 801 Drum Burial Site source area contaminants. The groundwater remedy also includes a contingent remedy of SVE with AS.

7.2 REMEDIAL ACTION GOALS

The final cleanup levels for soil and groundwater are presented in Table 7-1. The current and projected future land uses for the 801 Drum Burial Site are recreational; however, the source area is adjacent to a military housing unit. Therefore, the source area is visited frequently by the residents from the housing unit. The cleanup level for the contaminants of concern in soil is based on an excess lifetime cancer risk of 1×10^{-4} associated with a residential exposure scenario. This scenario is considered protective of the 801 Military Housing Area occupants and recreational users. These soil concentrations are considered to be protective of groundwater quality based on the contaminant fate and transport model conducted by EPA.

The cleanup levels for the contaminants of concern in groundwater are the federal and state drinking water MCLs, and when an MCL is unavailable, the cleanup level will be based on a risk-based concentration equivalent to an excess lifetime cancer risk of 1×10^{-6} for a residential exposure scenario. The cleanup levels for the contaminants of concern in groundwater are protective of downgradient residential, commercial, and Municipal Utility System well users.

7.3 MAJOR COMPONENTS OF THE SELECTED REMEDY

7.3.1 Soil—Removal and Disposal of Drums and Soil

Geophysical investigative apparatus will be employed to locate any remaining buried drums. Once the drum locations are confirmed, the drums and associated contaminated soil will be removed. The maximum excavation depth generally would be to the top of the groundwater, which is estimated to be approximately 15 feet below ground surface. The Army will initiate and maintain institutional controls to prevent the use of contaminated groundwater and to establish restrictions governing site access, construction of new facilities, and well development. The drums containing liquid will be sampled, overpacked, and disposed of at an off-site, permitted hazardous waste disposal facility. Excavated soils designated as RCRA hazardous materials through laboratory analysis would be disposed of at an off-site, permitted hazardous waste facility. If the current Treatability Study using rhizosphere-enhanced phytoremediation proves successful, then the excavated pesticide-contaminated soil will be treated on Fort Wainwright. The drums and soil that are not RCRA hazardous waste would be disposed of in the Fort Wainwright solid waste landfill, in accordance with the Fort Wainwright Solid Waste Landfill Permit. The excavations would be backfilled with clean soil.

7.3.2 Groundwater—Natural Attenuation, Institutional Controls, and Long-Term Monitoring/Evaluation with a Contingency of Soil Vapor Extraction and Air Sparging

Because the drums and associated contaminated soil are suspected to be the main source of contamination, contaminants of concern in groundwater are expected to decrease in concentration through natural attenuation processes following the removal activities. Groundwater monitoring points would be established within and surrounding the identified groundwater plume to confirm the

progress of natural attenuation and to verify that the contaminant plume does not migrate from the source area. If the results of groundwater monitoring indicate that the concentration of contaminants within the identified groundwater plume increases significantly over any three consecutive sampling events throughout the 20-year monitoring period, or if the designated monitoring points surrounding the plume indicate that the contaminants are migrating away from the source area, then a contingent remedy of an SVE/AS system would be implemented. The SVE/AS system would reduce the levels of volatile contaminants, thereby reducing the overall risk associated with the source area. For the pesticide contamination, the agencies may consider an innovative technology if one becomes available.

In this alternative it establishes and maintain institutional controls to ensure that the groundwater will not be used until federal and state MCLs are attained, except for activities undertaken to initiate the selected remedies detailed in this ROD. Institutional controls include restrictions governing site access, construction, and well development or placement as long as hazardous substances remain on site at levels that preclude unrestricted use. The Army shall ensure compliance with the institutional controls in place at this site because noncompliance will violate a requirement of this ROD, therefore violates the Fort Wainwright Federal Facility Agreement between the Army, U.S. Environmental Protection Agency, and Alaska Department of Environmental Conservation.

To ensure long-term effectiveness of this remedy, the Army's permanent implementation processes and policies for implementing institutional controls will be developed through joint EPA, ADEC, and Army negotiations. These implementation processes and policies are intended to be in place before the OU-5 postwide ROD.

An SVE/AS system would be placed in areas of highest contamination and operated for a period of five years or until groundwater cleanup levels are achieved. After active treatment achieves the cleanup levels, natural attenuation will be relied on to meet AWQS (18 AAC 70).

7.3.3 Five-Year Review

Because the selected remedy will result in hazardous substances remaining above health-based levels, U.S. Army Alaska will initiate and maintain institutional controls to prevent the use of contaminated groundwater until contaminant levels are below state and federal MCLs. The controls will include restrictions governing site access, construction, and well development as long as hazardous substances remain on site at levels that preclude unrestricted use. Land and groundwater use restrictions shall be incorporated into the Fort Wainwright Master Plan. Copies of the Fort Wainwright Master Plan will be given to EPA and ADEC. The review for this operable unit will include, but not be limited to, assessing the remedial action's effectiveness in achieving cleanup levels and the appropriateness of monitoring well locations and monitoring frequency. Natural attenuation will be assessed through a decreasing trend in the concentration of contaminants of concern, availability of electron acceptors, and other relevant parameters over a five-year period.

Table 7-1

REMEDIAL ACTION OBJECTIVES AND REMEDIATION GOALS
801 DRUM BURIAL SITE
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA

Media	Remedial Action Objectives	Chemicals of Concern[a]	Final Cleanup Levels	Basis
Surface and Subsurface soil	Environmental Protection Prevent migration of chemicals of concern Human Health Reduce cancer risk to within or below the EPA accepted risk range of 1×10^{-4} to 1×10^{-6}.	Aldrin	3.8 mg/kg	1×10^{-4}[b]
		Dieldrin	4.0 mg/kg	1×10^{-4}[b]
Groundwater	Environmental Protection Restore groundwater to below chemical-specific ARARs Human Health Reduce cancer risk to within or below the EPA accepted risk range of 1×10^{-4} to 1×10^{-6}	Aldrin	0.004 µg/L	1×10^{-6}[c]
		Dieldrin	0.004 µg/L	1×10^{-6}[c]
		1,1-Dichloroethene	7 µg/L	MCL
		Benzene	5 µg/L	MCL
		Vinyl Chloride	2 µg/L	MCL

Note: Diesel-range organics will be cleaned up to levels consistent with proposed State of Alaska regulations (18 AAC 75).

a Monitoring and sampling will follow EPA protocols and will not be limited to the specific contaminants of concern.

b Risk for soil is based on residential exposure scenario of an excess lifetime cancer risk of 1×10^{-4}.

c Risk for groundwater based on federal and state drinking water MCLs or an excess lifetime cancer risk of 1×10^{-6} for residential exposure scenario if an MCL is not available.

Key:
AAC = Alaska Administrative Code.
ADEC = Alaska Department of Environmental Conservation.
ARARs = Applicable or relevant and appropriate requirements.
DRO = Diesel range organics.
EPA = United States Environmental Protection Agency.
MCL = Maximum contaminant level.
µg/L = Micrograms per liter.
mg/kg = Milligrams per kilogram.

8.0 STATUTORY DETERMINATIONS

The main responsibility of the Army, the Alaska Department of Environmental Conservation (ADEC), and the United States Environmental Protection Agency (EPA) under their legal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) authority is to select remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986, provides several statutory requirements and preferences. The selected remedy must be cost-effective and utilize permanent treatment technologies or resource recovery technologies to the maximum extent practicable. The statute also contains a preference for remedies that permanently or significantly reduce the volume, toxicity, or mobility of hazardous substances through treatment. Lastly, CERCLA requires that the selected remedial action for each source area must comply with applicable or relevant and appropriate requirements (ARARs) established under federal and state environmental laws, unless a waiver is granted.

8.1 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The selected alternative for the 801 Drum Burial Site will provide long-term protection of human health and the environment and satisfy the requirements of Section 121 of CERCLA.

8.1.1 801 Drum Burial Site

The selected remedy will provide long-term protection of human health and the environment. Removal of the main sources of contamination would reduce the risk associated with exposure to drums and contaminated soil, and it would minimize further contamination of the groundwater. Natural attenuation of the contaminants in the groundwater would occur over time. Groundwater monitoring/evaluation would be implemented to track not only the progress of natural attenuation but to ensure that the use of groundwater downgradient from the source area meets federal and state drinking water standards. The groundwater remedy also includes a contingent remedy of soil vapor extraction and air sparging.

8.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO-BE-CONSIDERED GUIDANCE

The selected remedy for the 801 Drum Burial Site will comply with all ARARs of federal and state environmental and public health laws, including compliance with all the location-, chemical-, and action-specific ARARs listed below. No other waiver of any ARAR is being sought or invoked for any component of the selected remedies.

8.2.1 Applicable or Relevant and Appropriate Description

An ARAR may be either "applicable" or "relevant and appropriate." Applicable requirements are those substantive environmental protection standards, criteria, or limitations, promulgated under federal or state law, that specifically address a hazardous substance, remedial action, location, or other circumstance at a CERCLA site. Relevant and appropriate requirements are those substantive environmental protection requirements, promulgated under federal and state law, that while not legally applicable to the circumstances at a CERCLA site, address situations sufficiently similar to those encountered at the CERCLA site so that their use is well-suited to the particular site. The three types

of ARARs are described below:

- Chemical-specific ARARs are usually health- or risk-based numerical values or methodologies that establish an acceptable amount or concentration of a chemical in the ambient environment;

- Action-specific ARARs are usually technology- or activity-based requirements for remedial actions; and

- Location-specific ARARs are restrictions placed on the concentration of hazardous substances or the conduct of activity solely because they occur in special locations.

To-be-considered (TBC) requirements are nonpromulgated federal or state standards or guidance documents that are to be used on an "as appropriate" basis in developing cleanup standards. Because they are not promulgated or enforceable, they do not have the same status as ARARs and are not considered required cleanup standards. They generally fall into three categories:

- Health effects information with a high degree of credibility;

- Technical information regarding how to perform or evaluate site investigations or response actions; and

- State or federal agency policy documents.

8.2.2 Chemical-Specific Applicable or Relevant and Appropriate Requirement

- Federal Safe Drinking Water Act (40 Code of Federal Regulations [CFR] 141) and Alaska Drinking Water Regulations (18 Alaska Administrative Code [AAC] 80): The maximum contaminant level (MCL) and non-zero maximum contaminant level goals established under the Safe Drinking Water Act are relevant and appropriate requirements for groundwater that is a potential drinking water source;

- Alaska Water Quality Standards (AWQS; 18 AAC 70): Alaska Water Quality Standards for Protection of Class (1)(A) Water Supply, Class (1)(B) Water Recreation, and Class (1) Aquatic Life and Wildlife (18 AAC 70) are applicable to the 801 Drum Burial Site source area. Many of the constituents of groundwater regulated by AWQS are identical to MCLs in Drinking Water Standards; and

- Alaska Solid Waste Management Regulations (18 AAC 60): The Alaska Solid Waste Management Regulations are applicable to the disposal of nonhazardous soil at the Fort Wainwright Landfill.

8.2.3 Location-Specific Applicable or Relevant and Appropriate Requirement

- Clean Water Act Section 404: Section 404 of the Clean Water Act,

which is implemented by EPA and the Army through regulations found in 40 CFR 230 and 33 CFR 320 to 330, prohibits the discharge of dredged or fill materials into waters of the United States without a permit. This statute is relevant and appropriate to the protection of wetlands adjacent to the 801 Drum Burial Site; and

- National Historic Preservation Act of 1966: Section A106, which is implemented by the Advisory Council on Historic Preservation and the Army through regulations found in 36 CFR 800 through 800.15, 16 United States Code (USC) 470 et seqeua, and Public Law 89-665, requires federal agencies to take into account the effects of the agency's undertaking on properties included in or eligible for the National Register of Historic Places and, before approval of an undertaking, to afford the State Historical Preservation Officer and the Advisory Council on Historic Preservation a reasonable opportunity to comment on the undertaking. This statute is relevant and appropriate to the protection of the Ladd Field National Historic Landmark/District.

8.2.4 Action-Specific Applicable or Relevant and Appropriate Requirement

- Resource Conservation and Recovery Act (40 CFR 261, 262, 263, 264, and 268): Applicable for identifying, storing, transporting, and disposing of hazardous wastes;

- EPA Off-Site Disposal Rule (40 CFR 300.440): Procedures for planning and implementing off-site response actions;

- Federal Clean Air Act (42 USC 7401), as amended, and implementing regulations (Ambient Air Quality Standards, 40 CFR 50) are applicable for venting contaminated vapors;

- Executive Order 11988, Floodplain Management (May 24, 1977): Because the site is in a 100-year floodplain, Executive Order 11988 is applicable. The remedial action will be designed to avoid long- and short-term adverse impacts on the floodplain;

- Army Regulation (AR) 200-2, Environmental Quality, Environmental Effects of Army Actions: This regulation states Department of the Army (DA) policy, assigns responsibilities, and establishes procedures for the integration of environmental considerations into Army planning and decision making in accordance with 42 USC 4321 et seq., "National Environmental Policy Act of 1969"; the Council on Environmental Quality regulations of November 29, 1978; and

- AR 210-20 (Army Installation Master Planning Program): This regulation explains the concept of comprehensive planning and establishes policies, procedures, and responsibilities for implementing

the Army Installation Master Planning Program. It also establishes the requirements and procedures for developing, submitting for approval, updating, and implementing the Installation Master Plan.

8.2.5 Information to be Considered

The following information TBC will be used as a guideline when implementing the selected remedy:

- State of Alaska Petroleum Cleanup Draft Guidance will be used as a TBC for cleanup of petroleum contamination in soils.

8.3 COST EFFECTIVENESS

The selected remedy is cost-effective because it provides overall protectiveness proportional to costs.

8.4 UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES OR RESOURCE RECOVERY TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE

The U.S. Army, ADEC, and EPA have determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be used in a cost-effective manner at the Operable Unit 1 source areas. Of those alternatives that protect human health and the environment and comply with ARARs, the Army, ADEC, and EPA have determined that the selected remedy provides the best balance of trade-offs in terms of long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; cost; and the statutory preference for treatment as a principal element in considering state and community acceptance.

8.5 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

The selected remedy for the 801 Drum Burial Site does not actively treat groundwater; however, the contingent remedy would use groundwater and soil treatment as principal elements if deemed necessary.

9.0 DOCUMENTATION OF SIGNIFICANT CHANGES

The selected remedy for the 801 Drum Burial Site source area is the same preferred alternative presented in the Proposed Plan. No changes in the components of the preferred alternative have been made.

APPENDIX A

CHRONOLOGICAL SUMMARY OF DETECTED ANALYTES IN GROUNDWATER AT 801 DRUM BURIAL SITE

Table A-1

HISTORICAL SUMMARY OF DETECTED ANALYTES
801 DRUM BURIAL SITE MONITORING WELLS
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA

AP Number	AP6326	AP6326	AP6326 Dup	AP6327	AP6327	AP6327
Lab ID	K96545401	K96819701	K96819702	232393	K96538302	K96811405
Date	Aug 29, 96	Dec 16, 96	Dec 16, 96	Dec 22, 94	Aug 27, 96	Dec 14, 96
GW Elevation		427.32	427.32			426.99
Volatile Organic Compounds (µg/L)						
1,1-Dichloroethene	2.8	8.7	9	--	--	0.5 U
1,2,3-Trichlorobenzene	--	2 U	2 U	--	--	2 U
1,2,4-Trichlorobenzene	--	2 U	2 U	--	--	2 U
1,2,4-Trimethylbenzene	0.2 J	0.5 J	0.4 J	120 J	97	160
1,2-Dichlorobenzene	--	0.5 U	0.5 U	--	--	0.5 U
1,3,5-Trimethylbenzene	--	0.2 J	0.2 J	40 J	31	53
1,4-Dichlorobenzene	--	0.5 U	0.5 U	--	--	0.5 U
2-Butanone	--	20 U	20 U	--	1 J	20 U
2-Hexanone	--	--	--	--	4 J	--
4-Isopropyltoluene	--	2 U	2 U	--	--	7
4-Methyl-2-pentanone	4 J	--	--	--	--	--
Acetone	3 J,B	20 U	20 U	--	5 J,B	5 J,B
Benzene	2.2	4.6	4.6	39 J	38	43
Bromodichloromethane	--	0.5 U	0.5 U	--	--	0.5 U
Chloroform	0.1 J,B	0.2 J	0.2 J	--	0.2 J	0.5 U
Chloromethane	--	--	--	--	--	--
cis-1,2-Dichloroethene	320	990	970	2.2 J	5.1	4.3
Dichlorodifluoromethane	--	0.5 U	0.5 U	--	--	0.5 U
Ethylbenzene	0.1 J	0.2 J	0.2 J	51 J	40	44
Isopropylbenzene	0.07 J	0.1 J	0.1 J	14 J	15	17
Methylene chloride	--	1 U	1 U	--	--	1 U
n-Butylbenzene	--	2 U	2 U	--	--	3
n-Propylbenzene	--	2 U	2 U	18 J	17	18
Naphthalene	0.1 J,B	2 U	2 U	32 J	28	30
p-Isopropyltoluene	--	--	--	6.4 J	6	--
sec-Butylbenzene	--	--	--	5.2 J	5	--
tert-Butylbenzene	--	--	--	--	0.8 J	--
Tetrachloroethene	--	0.5 U	0.5 U	--	--	0.1 J,B
Toluene	0.4 J	0.5	0.5	2.0 J	2.7	5.4
Total Xylenes	0.8	1.1	1.1	74 J	74	110
trans-1,2-Dichloroethene	30	80	80	--	--	0.5 U
Trichloroethene	2.9	3.8	4	--	--	0.5 U
Vinyl chloride	1	2.4	2.5	--	0.2 J	0.3 J
Pesticides (µg/L)						
4,4'-DDD	--	0.04 U	0.04 U	--	--	0.04 U
4,4'-DDT	--	0.04 U	0.04 U	--	--	0.04 U
Aldrin	--	--	--	--	--	--
Dieldrin	0.78	0.7	0.8	--	0.006 J	0.04 J
Endosulfan II	--	--	--	--	--	--
Endrin	0.009 J	0.04 U	0.04 U	--	--	0.01 J
Endrin aldehyde	--	0.04 U	0.04 U	--	--	0.04 U
gamma-BHC (Lindane)	--	0.04 U	0.04 U	--	--	0.04 U
Heptachlor	--	0.04 U	0.04 U	--	--	0.04 U
Heptachlor epoxide	--	0.04 U	0.04 U	--	--	0.04 U

Table A-1 (cont.)

HISTORICAL SUMMARY OF DETECTED ANALYTES
801 DRUM BURIAL SITE MONITORING WELLS
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA

AP Number	AP6328	AP6328	AP6328 Dup	AP6328	AP6328 Dup
Lab ID	232394	K96538301	K96538307	K96819703	K96819704
Date	Dec 22, 94	Aug 27, 96	Aug 27, 96	Dec 16, 96	Dec 16, 96
GW Elevation				427.37	427.37
Volatile Organic Compounds (µg/L)					
1,1-Dichloroethene	--	--	--	0.5 U	0.5 U
1,2,3-Trichlorobenzene	--	--	--	2 U	2 U
1,2,4-Trichlorobenzene	--	--	--	2 U	2 U
1,2,4-Trimethylbenzene	--	0.2 J	0.2 J	0.2 J	0.2 J
1,2-Dichlorobenzene	--	--	--	0.5 U	0.5 U
1,3,5-Trimethylbenzene	--	--	--	0.06 J	0.06 J
1,4-Dichlorobenzene	--	--	--	0.5 U	0.5 U
2-Butanone	--	--	--	20 U	20 U
2-Hexanone	--	--	--	--	--
4-Isopropyltoluene	--	--	--	2 U	2 U
4-Methyl-2-pentanone	--	--	--	--	--
Acetone	--	--	--	2 J,B	3 J,B
Benzene	--	--	--	0.09 J	0.08 J
Bromodichloromethane	--	--	--	0.5 U	0.5 U
Chloroform	--	0.4 J	0.5 J	0.3 J	0.2 J
Chloromethane	--	--	--	--	--
cis-1,2-Dichloroethene	--	--	--	0.5 J	0.3 J
Dichlorodifluoromethane	--	--	--	0.5 U	0.5 U
Ethylbenzene	--	0.09 J	--	0.08 J	0.09 J
Isopropylbenzene	--	--	0.06 J	2 U	2 U
Methylene chloride	--	--	--	1 U	0.09 J,B
n-Butylbenzene	--	--	--	2 U	2 U
n-Propylbenzene	--	--	--	2 U	2 U
Naphthalene	--	--	--	2 U	2 U
p-Isopropyltoluene	--	--	--	--	--
sec-Butylbenzene	--	--	--	--	--
tert-Butylbenzene	--	--	--	--	--
Tetrachloroethene	--	--	--	0.5 U	0.5 U
Toluene	--	0.6	0.4 J	0.3 J	0.3 J
Total Xylenes	--	1.3	1	0.5 J	0.5
trans-1,2-Dichloroethene	--	--	--	0.5 U	0.5 U
Trichloroethene	--	--	--	0.5 U	0.5 U
Vinyl chloride	--	--	--	0.5 U	0.5 U
Pesticides (µg/L)					
4,4'-DDD	--	--	--	0.04 U	0.04 U
4,4'-DDT	--	--	--	0.04 U	0.04 U
Aldrin	--	--	--	--	--
Dieldrin	0.27	0.16	0.16	0.2	0.2
Endosulfan II	--	--	--	--	--
Endrin	--	--	--	0.04 U	0.004 J
Endrin aldehyde	--	--	--	0.04 U	0.04 U
gamma-BHC (Lindane)	--	--	--	0.04 U	0.04 U
Heptachlor	--	--	--	0.04 U	0.04 U
Heptachlor epoxide	--	--	--	0.001 J	0.04 U

Table A-1 (cont.)

HISTORICAL SUMMARY OF DETECTED ANALYTES
801 DRUM BURIAL SITE MONITORING WELLS
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA

AP Number	AP6329	AP6330	AP6330	AP6331	AP6331	AP6331 Dup
Lab ID	232388	K96545402	K96815602	K96545403	K96815605	K96815606
Date	Dec 22, 94	Aug 29, 96	Dec 13, 96	Aug 29, 96	Dec 16, 96	Dec 16, 96
GW Elevation			427.24		427.31	427.31
Volatile Organic Compounds (µg/L)						
1,1-Dichloroethene	--	--	0.5 U	--	0.5 U	0.5 U
1,2,3-Trichlorobenzene	--	--	2 U	--	2 U	0.3 J
1,2,4-Trichlorobenzene	--	--	2 U	--	2 U	0.2 J
1,2,4-Trimethylbenzene	23 J	0.2 J	0.2 J	0.3 J	0.4 J,B	0.4 J
1,2-Dichlorobenzene	--	--	0.5 U	--	0.5 U	0.06 J
1,3,5-Trimethylbenzene	12 J	0.07 J	2 U	0.09 J	0.2 J,B	0.1 J
1,4-Dichlorobenzene	--	--	0.5 U	--	0.5 U	0.04 J
2-Butanone	--	3 J	20 U	2 J	20 U	20 U
2-Hexanone	--	--	--	--	--	--
4-Isopropyltoluene	--	--	2 U	--	2 U	2 U
4-Methyl-2-pentanone	--	5 J	--	9 J	--	--
Acetone	--	2 J,B	3 J,B	4 J,B	20 U	4 J,B
Benzene	14 J	0.08 J	0.08 J	--	0.1 J	0.2 J
Bromodichloromethane	--	--	0.5 U	--	0.5 U	0.07 J
Chloroform	--	0.3 J,B	0.4 J	0.2 J,B	0.3 J	0.4 J
Chloromethane	--	--	--	--	--	--
cis-1,2-Dichloroethene	--	0.4 J	0.5 U	1	1.5	1.5
Dichlorodifluoromethane	--	--	0.5 U	--	0.5 U	0.5 U
Ethylbenzene	--	0.07 J	0.07 J	0.1 J	0.2 J	0.2 J
Isopropylbenzene	5.8 J	--	2 U	--	0.1 J,B	0.09 J
Methylene chloride	--	--	1 U	--	1 U	0.1 J
n-Butylbenzene	--	--	2 U	--	2 U	2 U
n-Propylbenzene	5.7 J	--	2 U	--	2 U	2 U
Naphthalene	6.7 J	0.1 J,B	2 U	0.1 J,B	2 U	0.4 J,B
p-Isopropyltoluene	4.1 J	--	--	--	--	--
sec-Butylbenzene	1.6 J	--	--	--	--	--
tert-Butylbenzene	--	--	--	--	--	--
Tetrachloroethene	--	--	0.5 U	--	0.5 U	0.5 U
Toluene	--	0.3 J	0.4 J	0.4 J	0.6	0.6
Total Xylenes	43 J	0.7	0.6	0.9	1.1	1.1
trans-1,2-Dichloroethene	--	--	0.5 U	--	0.5 U	0.5 U
Trichloroethene	--	--	0.5 U	--	0.5 U	0.5 U
Vinyl chloride	--	--	0.5 U	--	0.5 U	0.5 U
Pesticides (µg/L)						
4,4'-DDD	--	--	0.04 U	--	0.04 U	0.04 U
4,4'-DDT	--	--	0.04 U	--	0.04 U	0.04 U
Aldrin	0.24	--	--	--	--	--
Dieldrin	0.064	0.08	0.12	1.1	1.5	1.4
Endosulfan II	--	--	--	--	--	--
Endrin	--	--	0.04 U	0.03 J	0.04	0.04
Endrin aldehyde	--	--	0.04 U	--	0.04 U	0.04 U
gamma-BHC (Lindane)	--	--	0.04 U	--	0.04 U	0.04 U
Heptachlor	--	--	0.04 U	--	0.004 J	0.04 U
Heptachlor epoxide	--	--	0.04 U	--	0.04 U	0.04 U

Table A-1 (cont.)

HISTORICAL SUMMARY OF DETECTED ANALYTES
801 DRUM BURIAL SITE MONITORING WELLS
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA

AP Number	AP6629	AP6629	AP6629	AP6630	AP6630	AP6630
Lab ID	232131	K96538303	K96819705	232132	K96538304	K96811404
Date	Dec 21, 94	Aug 27, 96	Dec 16, 96	Dec 21, 94	Aug 27, 96	Dec 13, 96
GW Elevation			427.31			427.36
Volatile Organic Compounds (µg/L)						
1,1-Dichloroethene	--	--	0.5 U	--	--	0.5 U
1,2,3-Trichlorobenzene	--	--	2 U	--	--	2 U
1,2,4-Trichlorobenzene	--	--	2 U	--	--	2 U
1,2,4-Trimethylbenzene	--	0.1 J	0.3 J	--	0.07 J	0.2 J
1,2-Dichlorobenzene	--	--	0.5 U	--	--	0.5 U
1,3,5-Trimethylbenzene	--	--	0.1 J	--	--	2 U
1,4-Dichlorobenzene	--	--	0.5 U	--	--	0.5 U
2-Butanone	--	--	20 U	--	--	20 U
2-Hexanone	--	--	--	--	--	--
4-Isopropyltoluene	--	--	2 U	--	--	2 U
4-Methyl-2-pentanone	--	--	--	--	--	--
Acetone	--	0.8 J,B	3 J,B	--	0.3 J,B	4 J,B
Benzene	--	--	0.2 J	--	--	0.08 J
Bromodichloromethane	--	--	0.5 U	--	--	0.5 U
Chloroform	--	0.8	0.4 J	--	0.3 J	0.3 J,B
Chloromethane	--	--	--	--	--	--
cis-1,2-Dichloroethene	--	--	2.7	--	--	0.5 U
Dichlorodifluoromethane	--	--	0.5 U	--	--	0.5 U
Ethylbenzene	--	--	0.2 J	--	--	0.07 J
Isopropylbenzene	--	--	0.06 J	--	0.06 J	2 U
Methylene chloride	--	--	1 U	--	--	0.1 J
n-Butylbenzene	--	--	2 U	--	--	2 U
n-Propylbenzene	--	--	2 U	--	--	2 U
Naphthalene	--	0.2 J	2 U	--	--	2 U
p-Isopropyltoluene	--	--	--	--	--	--
sec-Butylbenzene	--	--	--	--	--	--
tert-Butylbenzene	--	--	--	--	--	--
Tetrachloroethene	--	--	0.5 U	--	--	0.1 J,B
Toluene	--	0.3 J	0.6	--	0.4 J	0.4 J
Total Xylenes	--	0.7	0.8	--	0.7	0.6
trans-1,2-Dichloroethene	--	--	0.3 J	--	--	0.5 U
Trichloroethene	--	--	0.5 U	--	--	0.5 U
Vinyl chloride	--	--	0.5 U	--	--	0.5 U
Pesticides (µg/L)						
4,4'-DDD	--	--	0.04 U	--	--	0.04 U
4,4'-DDT	--	--	0.04 U	--	--	0.04 U
Aldrin	--	--	--	--	--	--
Dieldrin	--	--	0.002 J	--	--	0.04 U
Endosulfan II	--	--	--	--	--	--
Endrin	--	--	0.04 U	--	--	0.04 U
Endrin aldehyde	--	--	0.04 U	--	--	0.04 U
gamma-BHC (Lindane)	--	--	0.04 U	--	--	0.04 U
Heptachlor	--	--	0.04 U	--	--	0.04 U
Heptachlor epoxide	--	--	0.04 U	--	--	0.04 U

Table A-1 (cont.)

HISTORICAL SUMMARY OF DETECTED ANALYTES
801 DRUM BURIAL SITE MONITORING WELLS
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA

AP Number	AP6631	AP6631 Dup	AP6631	AP6631	AP7162	AP7162
Lab ID	232141	232142	K96538305	K96815601	K96532503	K96811403
Date	Dec 21, 94	Dec 21, 94	Aug 27, 96	Dec 13, 96	Aug 23, 96	Dec 13, 96
GW Elevation				427.35		427.29
Volatile Organic Compounds (µg/L)						
1,1-Dichloroethene	--	--	--	0.5 U	--	0.5 U
1,2,3-Trichlorobenzene	--	--	--	2 U	--	2 U
1,2,4-Trichlorobenzene	--	--	--	2 U	--	2 U
1,2,4-Trimethylbenzene	--	--	0.07 J	0.2 J	0.1 J	0.2 J
1,2-Dichlorobenzene	--	--	--	0.5 U	--	0.5 U
1,3,5-Trimethylbenzene	--	--	--	0.05 J	--	0.07 J
1,4-Dichlorobenzene	--	--	--	0.5 U	--	0.5 U
2-Butanone	--	--	--	20 U	--	20 U
2-Hexanone	--	--	--	--	--	--
4-Isopropyltoluene	--	--	--	2 U	0.08 J	2 U
4-Methyl-2-pentanone	--	--	--	--	--	--
Acetone	--	--	--	3 J,B	6 J,B	4 J,B
Benzene	--	--	--	0.07 J	0.09 J	0.2 J
Bromodichloromethane	--	--	--	0.5 U	--	0.2 J
Chloroform	--	--	0.3 J	0.2 J,B	0.3 J	1.5 B
Chloromethane	--	--	--	--	0.4 J	--
cis-1,2-Dichloroethene	--	--	--	0.5 U	--	0.5 U
Dichlorodifluoromethane	--	--	--	0.5 U	--	0.5 U
Ethylbenzene	--	--	--	0.08 J	0.07 J	0.1 J
Isopropylbenzene	--	--	--	2 U	--	0.1 J
Methylene chloride	--	--	--	1 U	0.2 J,B	1 U
n-Butylbenzene	--	--	--	2 U	--	2 U
n-Propylbenzene	--	--	--	2 U	--	2 U
Naphthalene	--	--	--	0.1 J	0.4 J,B	2 U
p-Isopropyltoluene	--	--	--	--	--	--
sec-Butylbenzene	--	--	--	--	--	--
tert-Butylbenzene	--	--	--	--	--	--
Tetrachloroethene	--	--	--	0.08 J,B	--	0.1 J,B
Toluene	--	5.1	0.3 J	0.4 J	0.5 J	0.8
Total Xylenes	--	--	0.6	0.6	0.9	1.2
trans-1,2-Dichloroethene	--	--	--	0.5 U	--	0.5 U
Trichloroethene	--	--	--	0.5 U	--	0.5 U
Vinyl chloride	--	--	--	0.5 U	--	0.5 U
Pesticides (µg/L)						
4,4'-DDD	--	--	--	0.04 U	0.005 J	0.003 J
4,4'-DDT	--	--	--	0.04 U	0.02 J	0.007 J
Aldrin	0.039 J	--	--	--	--	--
Dieldrin	--	--	0.007 J	0.008 J	--	0.04 U
Endosulfan II	--	--	--	--	--	--
Endrin	--	--	--	0.04 U	--	0.04 U
Endrin aldehyde	--	--	--	0.04 U	--	0.04 U
gamma-BHC (Lindane)	--	--	--	0.04 U	--	0.04 U
Heptachlor	--	--	--	0.04 U	--	0.04 U
Heptachlor epoxide	--	--	--	0.04 U	--	0.04 U

Table A-1 (cont.)

HISTORICAL SUMMARY OF DETECTED ANALYTES
801 DRUM BURIAL SITE MONITORING WELLS
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA

AP Number	AP7163	AP7163	AP7279	AP7279
Lab ID	K96538306	K96811401	K96649401	K96825801
Date	Aug 26, 96	Dec 13, 96	Oct 10, 96	Dec 17, 96
GW Elevation		427.11		427.22
Volatile Organic Compounds (µg/L)				
1,1-Dichloroethene	--	0.5 U	--	0.5 U
1,2,3-Trichlorobenzene	--	2 U	--	2 U
1,2,4-Trichlorobenzene	--	2 U	--	2 U
1,2,4-Trimethylbenzene	0.1 J	0.1 J	--	2 U
1,2-Dichlorobenzene	--	0.5 U	--	0.5 U
1,3,5-Trimethylbenzene	--	2 U	--	2 U
1,4-Dichlorobenzene	--	0.5 U	--	0.5 U
2-Butanone	--	0.5 J	--	20 U
2-Hexanone	--	--	--	--
4-Isopropyltoluene	--	2 U	--	2 U
4-Methyl-2-pentanone	--	--	--	--
Acetone	4 J,B	3 J,B	5 J	20 U
Benzene	0.2 J	0.2 J	--	0.5 U
Bromodichloromethane	--	0.5 U	0.1 J	0.5 U
Chloroform	0.3 J	0.1 J,B	2	0.2 J
Chloromethane	--	--	--	--
cis-1,2-Dichloroethene	5.4	3.9	--	0.5 U
Dichlorodifluoromethane	--	0.5 U	--	0.5 U
Ethylbenzene	0.07 J	0.5 U	--	0.5 U
Isopropylbenzene	0.1 J	2 U	--	2 U
Methylene chloride	0.1 J,B	0.1 J	--	1 U
n-Butylbenzene	--	2 U	--	2 U
n-Propylbenzene	--	2 U	--	2 U
Naphthalene	0.2 J,B	2 U	0.1 J	2 U
p-Isopropyltoluene	--	--	--	--
sec-Butylbenzene	--	--	--	--
tert-Butylbenzene	--	--	--	--
Tetrachloroethene	--	0.1 J,B	--	0.5 U
Toluene	0.6	0.3 J	0.3 J	0.1 J,B
Total Xylenes	1	0.4 J	0.2 J	0.5 U
trans-1,2-Dichloroethene	1.3	0.8	--	0.5 U
Trichloroethene	0.7	0.9	--	0.5 U
Vinyl chloride	--	0.5 U	--	0.5 U
Pesticides (µg/L)				
4,4'-DDD	--	0.04 U	--	0.04 U
4,4'-DDT	--	0.04 U	--	0.04 U
Aldrin	--	--	--	--
Dieldrin	0.02 J	0.02 J	0.0007 J	0.04 U
Endosulfan II	--	--	--	--
Endrin	--	0.04 U	--	0.04 U
Endrin aldehyde	--	0.002 J	--	0.04 U
gamma-BHC (Lindane)	--	0.04 U	--	0.04 U
Heptachlor	--	0.04 U	--	0.04 U
Heptachlor epoxide	--	0.04 U	--	0.04 U

Table A-1 (cont.)

HISTORICAL SUMMARY OF DETECTED ANALYTES
801 DRUM BURIAL SITE MONITORING WELLS
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA

AP Number	AP7280	AP7280 Dup	AP7280	AP7281	AP7281
Lab ID	K96655601	K96655606	K96825803	K96655602	K96825802
Date	Oct 14, 96	Oct 14, 96	Dec 17, 96	Oct 14, 96	Dec 17, 96
GW Elevation			427.28		427.31
Volatile Organic Compounds (µg/L)					
1,1-Dichloroethene	--	--	0.5 U	--	0.5 U
1,2,3-Trichlorobenzene	--	--	2 U	--	2 U
1,2,4-Trichlorobenzene	--	--	2 U	--	2 U
1,2,4-Trimethylbenzene	0.4 J	0.4 J	0.2 J	0.3 J	0.2 J
1,2-Dichlorobenzene	--	--	0.5 U	--	0.5 U
1,3,5-Trimethylbenzene	0.1 J	0.1 J	0.07 J	0.1 J	2 U
1,4-Dichlorobenzene	--	--	0.5 U	--	0.5 U
2-Butanone	7 J	5 J	20 U	5 J	20 U
2-Hexanone	--	--	--	--	--
4-Isopropyltoluene	0.9 J	0.8 J	2 U	0.3 J	2 U
4-Methyl-2-pentanone	0.7 J	--	--	0.8 J	--
Acetone	4 J	4 J	2 J	4 J	20 U
Benzene	0.08 J	0.07 J	0.1 J	0.07 J	0.08 J
Bromodichloromethane	--	--	0.5 U	0.08 J	0.5 U
Chloroform	1.7	1.7	0.2 J	1.7	0.1 J
Chloromethane	--	--	--	--	--
cis-1,2-Dichloroethene	--	--	0.5 U	--	0.2 J
Dichlorodifluoromethane	--	--	0.5 U	--	0.5 U
Ethylbenzene	0.07 J	0.06 J	0.06 J	0.06 J	0.5
Isopropylbenzene	--	--	2 U	--	2 U
Methylene chloride	--	0.1 J,B	1 U	0.1 J,B	1 U
n-Butylbenzene	0.2 J	0.2 J	2 U	0.1 J	2 U
n-Propylbenzene	0.1 J	0.09 J	2 U	--	2 U
Naphthalene	0.6 J,B	0.5 J,B	2 U	0.3 J,B	2 U
p-Isopropyltoluene	--	--	--	--	--
sec-Butylbenzene	--	--	--	--	--
tert-Butylbenzene	--	--	--	--	--
Tetrachloroethene	--	--	0.5 U	--	0.5 U
Toluene	0.4 J	0.4 J	0.4 J	0.4 J	0.2 J
Total Xylenes	0.7	0.7	0.5	0.9	0.5 U
trans-1,2-Dichloroethene	--	--	0.5 U	--	0.5 U
Trichloroethene	--	--	0.5 U	--	0.5 U
Vinyl chloride	--	--	0.5 U	--	0.5 U
Pesticides (µg/L)					
4,4'-DDD	--	--	0.04 U	--	0.04 U
4,4'-DDT	--	--	0.04 U	--	0.04 U
Aldrin	--	--	--	--	--
Dieldrin	0.001 J	0.001 J	0.0008 J	0.001 J	0.0008 J
Endosulfan II	--	--	--	--	--
Endrin	--	--	0.04 U	--	0.04 U
Endrin aldehyde	--	--	0.04 U	--	0.04 U
gamma-BHC (Lindane)	--	--	0.04 U	--	0.04 U
Heptachlor	--	--	0.04 U	--	0.04 U
Heptachlor epoxide	--	--	0.04 U	--	0.04 U

Table A-1 (cont.)

HISTORICAL SUMMARY OF DETECTED ANALYTES
801 DRUM BURIAL SITE MONITORING WELLS
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA

AP Number	AP7282	AP7282	AP7283	AP7283	AP7284	AP7284
Lab ID	K96655603	K96815603	K96655604	K96815604	K96655605	K96811402
Date	Oct 14, 96	Dec 16, 96	Oct 14, 96	Dec 16, 96	Oct 14, 96	Dec 13, 96
GW Elevation		427.25		427.33		427.33
Volatile Organic Compounds (µg/L)						
1,1-Dichloroethene	--	0.5 U	--	0.06 J	--	0.5 U
1,2,3-Trichlorobenzene	--	2 U	--	2 U	--	2 U
1,2,4-Trichlorobenzene	--	2 U	--	2 U	--	2 U
1,2,4-Trimethylbenzene	0.5 J	0.2 J	0.3 J	0.3 J	0.3 J	0.1 J
1,2-Dichlorobenzene	--	0.5 U	--	0.5 U	--	0.5 U
1,3,5-Trimethylbenzene	0.2 J	0.07 J	0.1 J	0.2 J	0.1 J	2 U
1,4-Dichlorobenzene	--	0.5 U	--	0.5 U	--	0.5 U
2-Butanone	4 J	20 U	10 J	20 U	--	20 U
2-Hexanone	--	--	--	--	--	--
4-Isopropyltoluene	0.2 J	0.1 J	0.3 J	2 U	0.1 J	2 U
4-Methyl-2-pentanone	--	--	1 J	--	--	--
Acetone	3 J	3 J,B	6 J	3 J,B	3 J	3 J,B
Benzene	0.1 J	0.1 J	0.2 J	0.2 J	0.08 J	0.08 J
Bromodichloromethane	--	0.5 U	--	0.06 J	--	0.5 U
Chloroform	1.3	0.2 J	1.4	0.9	1.3	0.2 J,B
Chloromethane	--	--	--	--	--	--
cis-1,2-Dichloroethene	--	1.1	--	6.4	--	0.5 U
Dichlorodifluoromethane	--	0.5 U	--	0.5 U	--	0.1 J
Ethylbenzene	0.1 J	0.1 J	0.3 J	0.2 J	0.2 J	0.06 J
Isopropylbenzene	--	0.05 J	0.2 J	0.07 J	0.1 J	2 U
Methylene chloride	0.2 J,B	0.08 J,B	0.1 J,B	0.08 J,B	0.2 J,B	1 U
n-Butylbenzene	0.2 J	2 U	0.4 J	2 U	0.2 J	2 U
n-Propylbenzene	0.1 J	2 U	0.3 J	2 U	0.2 J	2 U
Naphthalene	0.4 J,B	2 U	0.9 J,B	2 U	0.4 J,B	2 U
p-Isopropyltoluene	--	--	--	--	--	--
sec-Butylbenzene	--	--	0.2 J	--	--	--
tert-Butylbenzene	--	--	--	--	--	--
Tetrachloroethene	--	0.5 U	--	0.5 U	--	0.1 J,B
Toluene	0.6	0.6	1	0.5 J	0.6	0.3 J
Total Xylenes	1	0.7	1.4	0.9	0.9	0.5
trans-1,2-Dichloroethene	--	0.5 U	--	0.7	--	0.5 U
Trichloroethene	--	0.5 U	--	0.06 J	--	0.5 U
Vinyl chloride	--	0.5 U	--	0.5 U	--	0.5 U
Pesticides (µg/L)						
4,4'-DDD	--	0.04 U	--	0.04 U	--	0.04 U
4,4'-DDT	--	0.04 U	--	0.04 U	--	0.04 U
Aldrin	--	--	--	--	--	--
Dieldrin	0.004 J	0.006 J	0.0009 J	0.005 J	0.008 J	0.0007 J
Endosulfan II	--	--	--	--	--	--
Endrin	--	0.04 U	--	0.04 U	--	0.04 U
Endrin aldehyde	--	0.04 U	--	0.04 U	--	0.04 U
gamma-BHC (Lindane)	--	0.002 J	--	0.04 U	--	0.04 U
Heptachlor	--	0.04 U	--	0.04 U	--	0.04 U
Heptachlor epoxide	--	0.04 U	--	0.04 U	--	0.04 U

Table A-2

HISTORICAL SUMMARY OF DETECTED ANALYTES
801 DRUM BURIAL SITE MICROWELLS
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA

AP Number	PS3	PS3	PS4	PS4	PS5	PS5
Lab ID	50244-06	K96532501	50289-02	K96526201	50289-03	K96545404
Date	Jul 19, 95	Aug 23, 96	Jul 22, 95	Aug 21, 96	Jul 22, 95	Aug 29, 96
Volatile Organic Compounds (µg/L)						
1,1-Dichloroethene	--	--	--	--	--	--
1,2,3-Trichlorobenzene	--	--	--	--	--	--
1,2,4-Trichlorobenzene	--	--	--	--	--	--
1,2,4-Trimethylbenzene	--	0.09 J	--	--	--	0.9 J
1,2-Dichlorobenzene	--	--	--	--	--	--
1,3,5-Trimethylbenzene	--	--	--	--	--	0.3 J
1,4-Dichlorobenzene	--	--	--	--	--	--
2-Butanone	--	--	--	--	--	--
2-Hexanone	--	--	--	--	--	--
4-Isopropyltoluene	--	--	--	--	--	--
4-Methyl-2-pentanone	--	--	--	--	--	--
Acetone	--	6 J,B	--	--	--	5 J,B
Benzene	--	0.6 J	--	--	--	1.7
Bromodichloromethane	--	--	--	--	--	--
Chloroform	--	--	--	--	--	--
Chloromethane	--	--	--	--	--	--
cis-1,2-Dichloroethene	--	--	--	--	--	--
Dichlorodifluoromethane	--	--	--	--	--	--
Ethylbenzene	--	0.2 J	--	--	--	1.4
Isopropylbenzene	--	--	--	--	--	0.2 J
Methylene chloride	--	0.2 J,B	--	--	--	--
n-Butylbenzene	--	--	--	--	--	--
n-Propylbenzene	--	--	--	--	--	0.3 J
Naphthalene	--	0.2 J,B	--	--	--	0.1 J,B
p-Isopropyltoluene	--	--	--	--	--	--
sec-Butylbenzene	--	--	--	--	--	--
tert-Butylbenzene	--	--	--	--	--	--
Tetrachloroethene	--	--	--	--	--	--
Toluene	--	1.8	--	0.2 J	--	7.2
Total Xylenes	--	0.7	--	--	--	7.3
trans-1,2-Dichloroethene	--	--	--	--	--	--
Trichloroethene	--	0.3 J	--	--	--	--
Vinyl chloride	--	--	--	--	--	--
Pesticides (µg/L)						
4,4'-DDD	--	--	--	--	0.03	--
4,4'-DDT	--	--	--	--	0.031	--
Aldrin	--	--	--	--	0.25	0.21
Dieldrin	--	0.002 J	--	0.02 J	0.46	0.34
Endosulfan II	--	--	--	--	0.039	--
Endrin	--	--	--	--	--	--
Endrin aldehyde	--	--	--	--	--	--
gamma-BHC (Lindane)	--	--	--	--	--	--
Heptachlor	--	--	--	--	--	--
Heptachlor epoxide	--	--	--	--	0.015	--

Table A-2 (cont.)

HISTORICAL SUMMARY OF DETECTED ANALYTES
801 DRUM BURIAL SITE MICROWELLS
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA

AP Number Lab ID Date	PS6 50244-07 Jul 19, 95	PS6 K96545405 Aug 29, 96	PS7 51266-09 Sep 4, 95	PS7 K96545406 Aug 28, 96	PS7 DUP K96545408 Aug 29, 96
Volatile Organic Compounds (µg/L)					
1,1-Dichloroethene	--	--	--	--	--
1,2,3-Trichlorobenzene	--	--	--	--	--
1,2,4-Trichlorobenzene	--	--	--	--	--
1,2,4-Trimethylbenzene	--	0.3 J	--	0.4 J	0.4 J
1,2-Dichlorobenzene	--	--	--	--	--
1,3,5-Trimethylbenzene	--	0.09 J	--	0.06 J	0.06 J
1,4-Dichlorobenzene	--	--	--	--	--
2-Butanone	--	--	--	--	--
2-Hexanone	--	--	--	--	--
4-Isopropyltoluene	--	--	--	--	--
4-Methyl-2-pentanone	--	--	--	--	--
Acetone	--	2 J,B	--	3 J,B	3 J,B
Benzene	--	0.4 J	--	1.3 J	1.2
Bromodichloromethane	--	--	--	--	--
Chloroform	--	--	--	0.07 J,B	0.07 J,B
Chloromethane	--	--	--	--	--
cis-1,2-Dichloroethene	--	--	--	--	--
Dichlorodifluoromethane	--	--	--	--	--
Ethylbenzene	--	0.4 J	--	1 J	1
Isopropylbenzene	--	--	--	0.2 J	0.2 J
Methylene chloride	--	--	--	--	--
n-Butylbenzene	--	--	--	--	--
n-Propylbenzene	--	0.09 J	--	0.2 J	0.2 J
Naphthalene	--	--	--	0.1 J,B	0.1 J,B
p-Isopropyltoluene	--	--	--	--	--
sec-Butylbenzene	--	--	--	--	--
tert-Butylbenzene	--	--	--	--	--
Tetrachloroethene	--	--	--	--	--
Toluene	--	2	--	5 J	5.1
Total Xylenes	--	2.2	--	4.5 J	4.1
trans-1,2-Dichloroethene	--	--	--	--	--
Trichloroethene	--	--	--	--	--
Vinyl chloride	--	--	--	--	--
Pesticides (µg/L)					
4,4'-DDD	--	--	--	--	--
4,4'-DDT	--	--	--	--	--
Aldrin	0.046	0.02 J	--	--	--
Dieldrin	0.49	0.19	--	0.08	0.1
Endosulfan II	--	--	--	--	--
Endrin	--	--	--	--	--
Endrin aldehyde	--	--	--	--	--
gamma-BHC (Lindane)	--	--	--	--	--
Heptachlor	--	--	--	--	--
Heptachlor epoxide	--	--	--	--	--

Table A-2 (cont.)

HISTORICAL SUMMARY OF DETECTED ANALYTES
801 DRUM BURIAL SITE MICROWELLS
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA

AP Number	PS10	PS10	PS12	PS12	PS13	PS13
Lab ID	50289-05	K96530904	50289-06	K96526202	50289-07	K96526203
Date	Jul 22, 95	Aug 22, 96	Jul 22, 95	Aug 21, 96	Jul 22, 95	Aug 21, 96
Volatile Organic Compounds (µg/L)						
1,1-Dichloroethene	--	--	--	--	--	--
1,2,3-Trichlorobenzene	--	--	--	--	--	--
1,2,4-Trichlorobenzene	--	--	--	--	--	--
1,2,4-Trimethylbenzene	--	0.07 J	--	--	--	--
1,2-Dichlorobenzene	--	--	--	--	--	--
1,3,5-Trimethylbenzene	--	--	--	--	--	--
1,4-Dichlorobenzene	--	--	--	--	--	--
2-Butanone	--	--	--	--	--	--
2-Hexanone	--	--	--	--	--	--
4-Isopropyltoluene	--	--	--	--	--	--
4-Methyl-2-pentanone	--	--	--	--	--	--
Acetone	--	3 J,B	--	--	--	--
Benzene	--	--	--	--	--	--
Bromodichloromethane	--	--	--	--	--	--
Chloroform	--	--	--	--	--	--
Chloromethane	--	--	--	--	--	--
cis-1,2-Dichloroethene	--	--	--	--	--	--
Dichlorodifluoromethane	--	--	--	--	--	--
Ethylbenzene	--	--	--	--	--	--
Isopropylbenzene	--	--	--	--	--	--
Methylene chloride	--	--	--	0.08 J	--	--
n-Butylbenzene	--	--	--	--	--	--
n-Propylbenzene	--	--	--	--	--	--
Naphthalene	--	--	--	--	--	--
p-Isopropyltoluene	--	--	--	--	--	--
sec-Butylbenzene	--	--	--	--	--	--
tert-Butylbenzene	--	--	--	--	--	--
Tetrachloroethene	--	--	--	--	--	--
Toluene	--	0.3 J	--	0.2 J	--	0.06 J
Total Xylenes	--	0.4 J	--	--	--	--
trans-1,2-Dichloroethene	--	--	--		--	--
Trichloroethene	--	--	--	0.07 J	--	0.06 J
Vinyl chloride	--	--	--	--	--	--
Pesticides (µg/L)						
4,4'-DDD	--	--	--	--	--	--
4,4'-DDT	0.015	--	0.015	--	--	--
Aldrin	--	--	--	--	0.019	0.006 J
Dieldrin	--	0.001 J	--	0.003 J	0.087	0.11
Endosulfan II	--	--	--	--	--	--
Endrin	--	--	--	--	--	--
Endrin aldehyde	--	--	--	--	--	--
gamma-BHC (Lindane)	--	--	--	--	--	--
Heptachlor	--	--	--	--	--	--
Heptachlor epoxide	--	--	--	--	--	--

Table A-2 (cont.)

HISTORICAL SUMMARY OF DETECTED ANALYTES
801 DRUM BURIAL SITE MICROWELLS
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA

AP Number	PS16	PS16	PS17	PS17
Lab ID	50289-08	K96526204	50258-01	K96532502
Date	Jul 21, 95	Aug 21, 96	Jul 20, 95	Aug 23, 96
Volatile Organic Compounds (µg/L)				
1,1-Dichloroethene	--	--	--	--
1,2,3-Trichlorobenzene	--	--	--	--
1,2,4-Trichlorobenzene	--	--	--	--
1,2,4-Trimethylbenzene	--	--	--	0.2 J
1,2-Dichlorobenzene	--	--	--	--
1,3,5-Trimethylbenzene	--	--	--	--
1,4-Dichlorobenzene	--	--	--	--
2-Butanone	--	--	--	--
2-Hexanone	--	--	--	--
4-Isopropyltoluene	--	--	--	--
4-Methyl-2-pentanone	--	--	--	--
Acetone	--	--	--	5 J,B
Benzene	--	--	--	0.9
Bromodichloromethane	--	--	--	--
Chloroform	--	--	--	--
Chloromethane	--	--	--	--
cis-1,2-Dichloroethene	--	--	--	1.5
Dichlorodifluoromethane	--	--	--	--
Ethylbenzene	--	--	--	0.1 J
Isopropylbenzene	--	--	--	--
Methylene chloride	--	--	--	0.2 J,B
n-Butylbenzene	--	--	--	--
n-Propylbenzene	--	--	--	--
Naphthalene	--	--	--	0.2 J,B
p-Isopropyltoluene	--	--	--	--
sec-Butylbenzene	--	--	--	--
tert-Butylbenzene	--	--	--	--
Tetrachloroethene	--	--	--	--
Toluene	--	0.2 J	--	1.4
Total Xylenes	--	--	--	0.6
trans-1,2-Dichloroethene	--	--	--	--
Trichloroethene	--	0.1 J	--	0.6
Vinyl chloride	--	--	--	--
Pesticides (µg/L)				
4,4'-DDD	0.021	--	--	--
4,4'-DDT	0.06	--	--	--
Aldrin	0.57	0.29	--	--
Dieldrin	0.32	0.33	--	--
Endosulfan II	0.036	--	--	--
Endrin	--	--	--	--
Endrin aldehyde	--	--	--	--
gamma-BHC (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor epoxide	--	--	--	--

Table A-2 (cont.)

HISTORICAL SUMMARY OF DETECTED ANALYTES
801 DRUM BURIAL SITE MICROWELLS
OPERABLE UNIT 1
FORT WAINWRIGHT, ALASKA

AP Number	PS18	PS18	PS18 DUP	PS20
Lab ID	50258-02	K96526205	K96526207	51266-01
Date	Jul 20, 95	Aug 21, 96	Aug 21, 96	Sep 5, 95
Volatile Organic Compounds (µg/L)				
1,1-Dichloroethene	--	--	--	--
1,2,3-Trichlorobenzene	--	--	--	--
1,2,4-Trichlorobenzene	--	--	--	--
1,2,4-Trimethylbenzene	--	--	--	--
1,2-Dichlorobenzene	--	--	--	--
1,3,5-Trimethylbenzene	--	--	--	--
1,4-Dichlorobenzene	--	--	--	--
2-Butanone	--	--	--	--
2-Hexanone	--	--	--	--
4-Isopropyltoluene	--	--	--	--
4-Methyl-2-pentanone	--	--	--	--
Acetone	--	--	--	--
Benzene	--	--	--	--
Bromodichloromethane	--			--
Chloroform	--	--	--	--
Chloromethane	--			--
cis-1,2-Dichloroethene	--	--	--	--
Dichlorodifluoromethane	--			--
Ethylbenzene	--	--	--	--
Isopropylbenzene	--	--	--	--
Methylene chloride	--	--	--	--
n-Butylbenzene	--	--	--	--
n-Propylbenzene	--	--	--	--
Naphthalene	--	--	--	--
p-Isopropyltoluene	--	--	--	--
sec-Butylbenzene	--	--	--	--
tert-Butylbenzene	--	--	--	--
Tetrachloroethene	--	--	--	--
Toluene	--	0.2 J	0.2 J	--
Total Xylenes	--	--	--	--
trans-1,2-Dichloroethene	--	--	--	--
Trichloroethene	--	0.09 J	0.08 J	--
Vinyl chloride	--	--	--	--
Pesticides (µg/L)				
4,4'-DDD	--	--	--	--
4,4'-DDT	--	--	--	--
Aldrin	--	--	--	--
Dieldrin	0.17	0.11	0.09	--
Endosulfan II	--	--	--	--
Endrin	--	--	--	--
Endrin aldehyde	--	--	--	--
gamma-BHC (Lindane)	--	--	--	--
Heptachlor	--	--	--	--
Heptachlor epoxide	--	--	--	--

APPENDIX B

RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY FOR THE RECORD OF DECISION FOR REMEDIAL ACTION AT OPERABLE UNIT 1, FORT WAINWRIGHT, ALASKA

OVERVIEW

The United States Army (Army), Alaska; United States Environmental Protection Agency; and Alaska Department of Environmental Conservation, collectively referred to as *the Agencies*, distributed a Proposed Plan for remedial action at Operable Unit 1 (OU-1), Fort Wainwright, Alaska. OU-1 comprises 22 source areas: the 801 Drum Burial Site, Building 1599, Building 2077, the Utilidor Expansion Drum Site, the Beacon Tower Landfill, the Blair Lakes Drum Site, Building 3015, Burial Site M, the Building 1128 Transformer Storage Yard, the Trainor Gate Railroad Spur, the Runway Radioactive Waste Site, the Birch Hill Radioactive Waste Site, Building 1567, Site N-4, the Chemical Agent Dump Site, the Transformer Storage Yard East of Building 3019, the Alaska Railroad Storage Yard, Building 2250, the Drum Site South of the Landfill, the Engineers Park Drum Site, the Motor Pool Buildings, and the Former Explosive Ordnance Detonation Range.

The Proposed Plan identifies a preferred remedial alternative for one source area within OU-1: the 801 Drum Burial Site.

The major components of the remedial alternative for the 801 Drum Burial Site are:

- Locating potential buried drums, and if found, removal and disposal of drums and contaminated soil;
- Institutional controls to prevent the use of contaminated groundwater and to restrict site access;
- Natural attenuation of groundwater with long-term groundwater monitoring; and
- A groundwater contingent remedy, which includes a soil vapor extraction and air sparging treatment system, when either the concentration of contaminants in the groundwater plume shows an increasing trend or the monitoring points around the plume indicate that contaminants are detected above groundwater cleanup levels.

No formal comments regarding the Proposed Plan for the OU-1 remedial action were submitted during the public comment period.

BACKGROUND OF COMMUNITY INVOLVEMENT

The public was encouraged to participate in the selection of the final remedies for OU-1 during a public comment period from March 4 to April 3, 1997. The *Fort Wainwright Proposed Plan for Remedial Action at Operable Unit 1* presents 11 combinations of options considered by the Agencies to address contamination in soil and groundwater at OU-1. The Proposed Plan was released to the public on February 28, 1997, and copies were sent to all known interested parties, including elected officials and concerned citizens. Informational Fact Sheets, dated March and September 1995,

provide information about the Army's entire cleanup program at Fort Wainwright and were mailed to the addresses on the same mailing list.

The Proposed Plan summarizes available information regarding the OU. Additional materials were placed in two information repositories: one at the Noel Wien Library in Fairbanks and the other at the Fort Wainwright Post Library. An Administrative Record, including all items placed in the information repositories and other documents used in the selection of the remedial actions, was established in Building 3023 on Fort Wainwright. The public was welcome to inspect materials available in the Administrative Record and the information repositories during business hours.

Interested citizens were invited to comment on the Proposed Plan and the remedy selection process by mailing comments to the Fort Wainwright project manager, by calling a toll-free telephone number to record a comment, or by attending and commenting at a public meeting on March 11, 1997, at the Carlson Center in Fairbanks.

Basewide community relations activities conducted for Fort Wainwright, which includes OU-1, have included:

- July 1992—Community interviews with local officials and interested parties;
- April 1993—Preparation of the Community Relations Plan;
- July 1993—Distribution of an informational Fact Sheet covering all OUs at Fort Wainwright;
- July 22, 1993—An informational public meeting covering all OUs;
- April 22, 1994—Establishment of information repositories at the Noel Wien Library and the Fort Wainwright Post Library and the Administrative Record at Building 3023 on Fort Wainwright;
- March 1995—Distribution of an informational Fact Sheet covering all OUs at Fort Wainwright;
- September 1995—Distribution of an informational Fact Sheet covering all OUs at Fort Wainwright;
- March 1996—Distribution of an informational Fact Sheet covering all OUs at Fort Wainwright;
- January 1997—Distribution of an informational Fact Sheet covering all OUs at Fort Wainwright; and
- March 1997—Distribution of an informational Fact Sheet regarding a Restoration Advisory Board (RAB). The fact sheet included an RAB membership application.

Community relations activities specifically conducted for OU-1 included:

- March 2, 5, 7, 9, and 11, 1997—Display advertisement announcing the public meeting in the *Fairbanks Daily News-Miner*;
- February 28, 1997—Distribution of the Proposed Plan for final remedial action at OU-1;
- March 4 to April 3, 1997—Public comment period. No extension was requested;
- March 4 to April 3, 1997—Telephone number for citizens to provide comments during the public comment period. The toll-free telephone number was advertised in the Proposed Plan and the newspaper display advertisement that announced the public meeting; and
- March 11, 1997—Meeting at the Carlson Center to provide information, a forum for questions and answers, and an opportunity for public comment regarding OU-1.

SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD

No comments were received during the public comment period.

APPENDIX C

COST ESTIMATES

Date 10/31/96
Time 13:50

$50 cu yds
500 drums

PROJECT SUMMARY REPORT

1D

Fort Wainwright AK
Samuel P. Swearingen
10/31/96

Alt 2

Category		Amount
PA/SI	$	0
Site Assessment	$	0
Studies		0
Remedial Design		0
RA Capital		31,666
Site Work		67,297
Sampling and Analysis		0
RA Professional Labor		0
Subcontractor Overhead & Profit		3,805
General Conditions		11,409
Studies/Professional Labor Overhead		0
Prime Contractor Home Office		6,623
Subtotal	$	120,800
Prime Contractor Profit - (Fee) (8.57%)		10,357
RA Operations and Maintenance		1,215,497
O&M Service Contract Overhead, Tax & Profit		198,127
Subtotal	$	1,544,781
Escalation		647,381
Total Contract Costs	$	2,192,162
Contingencies (10.00%)		219,216
Project Management (10.00%)		219,216
Total Project Costs	$	2,630,594

RA = 169,192
O&M = 2,461,402

********** END OF REPORT **********

* * * * This System Intended For Government Use Only * * * *

Date 10/31/96
Time 13:23

Alternative 3

PROJECT SUMMARY REPORT

1A
Soil capping/sve/as
Fort Wainwright AK
Samuel P. Swearingen
10/18/96

Category		Amount
PA/SI	$	0
Site Assessment	$	0
Studies		0
Remedial Design		0
RA Capital		111,714
Site Work		0
Sampling and Analysis		0
RA Professional Labor		0
Subcontractor Overhead & Profit		6,181
General Conditions		60,077
Studies/Professional Labor Overhead		0
Prime Contractor Home Office		8,591
Subtotal	$	186,563
Prime Contractor Profit - (Fee) (8.05%)		15,020
RA Operations and Maintenance		1,368,831
O&M Service Contract Overhead, Tax & Profit		223,121
Subtotal	$	1,793,535
Escalation		733,089
Total Contract Costs	$	2,526,624
Contingencies (25.00%)		631,656
Project Management (10.00%)		252,662
Total Project Costs	$	3,410,942

RA - 292,547
OM = 3,118,394

********** END OF REPORT **********

* * * * This System Intended For Government Use Only * * * *

Date 10/31/96
Time 14:33

PROJECT SUMMARY REPORT

)1B2
Drum Removal and Disposal with LTM/ No AS/SVE
Fort Wainwright AK
Samuel P. Swearingen
10/31/96

Alternative 4 with no AS/SVE

Category		Amount
PA/SI	$	0
Site Assessment	$	0
Studies		0
Remedial Design		0
RA Capital		662,899
Site Work		0
Sampling and Analysis		1,008,000
RA Professional Labor		0
Subcontractor Overhead & Profit		58,714
General Conditions		111,227
Studies/Professional Labor Overhead		0
Prime Contractor Home Office		89,107
Subtotal	$	1,929,947
Prime Contractor Profit - (Fee) (6.84%)		132,141
RA Operations and Maintenance		1,215,497
O&M Service Contract Overhead, Tax & Profit		198,127
Subtotal	$	3,475,712
Escalation		776,119
Total Contract Costs	$	4,251,831
Contingencies (10.00%)		425,183
Project Management (10.00%)		425,183
Total Project Costs	$	5,102,197

RA = 2,652,668
OM = 2,449,52

********** END OF REPORT **********

* * * * This System Intended For Government Use Only * * * *

Date 10/31/96
Time 14:19

Alt 4 contingent

PROJECT SUMMARY REPORT

w SVE/AS

801B
drum removal & disposal/sve/as
Fort Wainwright AK
sam swearingen
10/18/96

Category		Amount
PA/SI	$	0
Site Assessment	$	0
Studies		0
Remedial Design		0
RA Capital		734,146
Site Work		0
Sampling and Analysis		1,008,000
RA Professional Labor		0
Subcontractor Overhead & Profit		81,633
General Conditions		138,003
Studies/Professional Labor Overhead		0
Prime Contractor Home Office		94,009
Subtotal	$	2,055,791
Prime Contractor Profit - (Fee) (5.82%)		119,703
RA Operations and Maintenance		1,366,967
O&M Service Contract Overhead, Tax & Profit		222,818
Subtotal	$	3,765,279
Escalation		880,155
Total Contract Costs	$	4,645,434
Contingencies (10.00%)		464,543
Project Management (10.00%)		464,543
Total Project Costs	$	5,574,520

Total

RA=2,806,380
Cm=2,768,133

********** END OF REPORT **********

* * * * This System Intended For Government Use Only * * * *

Date 10/31/96
Time 14:00

PROJECT SUMMARY REPORT

contingent 5

801C
Drum Removal and Dipsosal/soil ex/groundwater P&T
Fort Wainwright AK
Samuel P Swearingen
10/18/96

Category		Amount
PA/SI	$	0
Site Assessment	$	0
Studies		0
Remedial Design		0
RA Capital		2,832,336
Site Work		0
Sampling and Analysis		2,016,000
RA Professional Labor		0
Subcontractor Overhead & Profit		205,044
General Conditions		148,725
Studies/Professional Labor Overhead		0
Prime Contractor Home Office		249,854
Subtotal	$	5,451,959
Prime Contractor Profit - (Fee) (5.10%)		278,205
RA Operations and Maintenance		1,242,295
O&M Service Contract Overhead, Tax & Profit		202,495
Subtotal	$	7,174,954
Escalation		1,077,028
Total Contract Costs	$	8,251,982
Contingencies (25.00%)		2,062,995
Project Management (10.00%)		825,198
Total Project Costs	$	11,140,175

RA-$315,899
OM=2,824,275

********** END OF REPORT **********

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APPENDIX D

INSTITUTIONAL CONTROLS DISCUSSION PAPER

APVR-RPW-EV

14 May 1997

Discussion Paper

SUBJECT: Institutional Controls

1. ISSUE:

Institutional controls are an administrative action that can be used to take the place of a remedial action at a site regulated by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), the Resource Conservation and Recovery Act, the National Contingency Plan or the comparative state law. Institutional controls place restriction on actions that can be conducted or uses that a piece of property can be put to. Examples can include limiting excavation, limiting use of groundwater, or limiting changes to a structure on the National Historic Preservation List. In order for the Environmental Protection Agency (EPA) and the State of Alaska, Department of Environmental Conservation (ADEC) to accept institutional controls, they must be enforceable.

2. FACTS:

a. Directorate of Public Works, Environmental Resources Department (DPW), working with Master Planning and Real Property, has established a protocol for establishing institutional controls. Information on the specific site to be subject to institutional controls is forwarded to Master Planning to be incorporated on the installation map. Real Property is copied on which sites have institutional controls in order to update their property records at the same time.

b. DPW is working through the Integrated Training Area Management program to provide copies of maps showing institutional controlled sites to both the Directorate of Plans, Training, Security and Mobilization, and Range Control.

c. A dig permit program is established within U. S. Army, Alaska (USARAK), which ensures any activities that could potentially impact an area covered by institutional controls are properly mitigated.

SUBJECT: Institutional Controls

d. USARAK has already established institutional controls at Bldg 702 and Bldg 47-662 on Fort Richardson. Further areas of Fort Richardson and Fort Wainwright have been placed under institutional controls in accordance with signed Records of Decisions (ROD). Additional areas of Fort Richardson and Fort Wainwright will be incorporated into institutional controls as the CERCLA RODs are signed.

e. Violation of a signed ROD or Decision Document is a violation of the Fort Richardson or Fort Wainwright Federal Facility Agreement (FFA) and CERCLA, and can result in criminal or civil fines as stipulated in the FFA. This does not include additional costs for corrective actions that would have to be taken at the site.

f. Institutional controls are being established because they are the most cost effective method for protecting human health and the environment, without engaging in active remediation. The institutional controls at Bldg 702 and 47-662 have saved USARAK approximately $800,000 and are expected to save another $3 million dollars within the next 5 years.

g. The EPA and ADEC are questioning USARAK's ability to enforce any institutional controls. Without a proven method for enforcement, EPA and ADEC will require active remedial actions which could cost millions.

3. KEY POINTS TO BE STRESSED:

a. A program for enforcement of institutional controls must be established.

b. Actions that violate an institutional control established in a ROD or other Decision Document also violate the law and place USARAK at risk of criminal and civil fines and penalties.

c. Institutional controls provide an opportunity for USARAK to be protective of human health and the environment, while being good stewards of the taxpayers money.

Johnson/384-3093
Swearingen